# COMPUTERWORLD

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## A Multitusking Task

**Univac customer engineer checks electronic equipment to be used by an October expedition reenacting Hannibal's crossing of the Alps with elephants in 218 B.C. The project is being conducted to gather information on the animals' resistance to cold, altitude and fatigue.**

**The elephants will have multichannel telemetry devices strapped to their hearts to detect heartbeats, body temperatures and brain activity. The data will be processed on a Univac 90/30 system.**

### *Protects Federal, EFT Systems*

# Senate Gets First DP Crime Bill

**By Catherine Arnst**
Of the CW Staff

WASHINGTON, D.C. — The first piece of legislation aimed specifically at computer crime was introduced in the Senate here last week.

The bill would make it a crime to misuse the computer systems of the federal government, certain financial institutions and other entities involved in interstate commerce.

Punishment for violators of the proposed law would be a jail term of up to 15 years and/or fines up to $50,000.

The legislation's sponsor, Sen. Abraham Ribicoff (D-Conn.), attaches "great importance" to the penalty portion of the bill.

"Computer criminals are the most sophisticated of all white-collar criminals," Ribicoff said. "They currently operate in an environment and under conditions in which the successful detection and prosecution of their crimes is very difficult.

"When they are apprehended and convicted, all too often the sentences they receive are extraordinarily light," he added.

It is Ribicoff's hope "that these increased penalties, unprecedented in federal criminal law for white-collar crime, will deter the potential computer thief and, at the same time, pose a warning to all white-collar criminals that Congress sees white-collar crime as a threat to our society which should be dealt with in a manner befitting the crime."

### EFT Protection

The bill also places emphasis on the prosecution of crimes against the computer systems of banks and other financial institutions that are insured or regulated by the federal government. The growth of electronic funds transfer (EFT) systems requires special protection because they are particularly vulnerable to criminal attack, Ribicoff said.

The proposal would guard against unauthorized access:

- To customer accounts by means of the theft or reproduction of an access key.
- To accounts by personnel manning access terminals.
- To communications lines between remote terminals and information storage areas.
- To the central processing site.

Existing laws are inadequate for prosecuting computer criminals, according to Ribicoff.

While there are some 40 sections under Title 18 of the U.S. Code that the government can apply to combat computer-related crime, all 40 were written for other types of crimes, he pointed out. Consequently, federal prosecutors have to "shoe horn their cases into already existing laws . . . that did not envision the technical aspects" of such crimes, he said.

The bill is a result of an inquiry begun May 10, 1976 by the Senate Governmental Affairs Committee, of which Ribicoff is chairman.

A staff report released Feb. 2 entitled "Computer Security in Federal Programs" demonstrated the government's inability to secure its 10,000 computers, discussed weaknesses in government procedures for predicting the integrity of its computer personnel and showed concern on the part of the federal law enforcement officials that the U.S. Code should be amended to strengthen the government's ability to prosecute computer crime.

It was noted in the report that a major computer crime conviction had been won in one case only because the perpetrator had used a telephone line to penetrate the computer system of a federal contractor across state lines. Had the telephone been used intrastate rather than interstate, the Wire Fraud Statute under which the indictment was brought could have been inadequte, federal prosecutors said.

In the same case, a part of the indictment was dismissed because electromagnetic impulses which transmitted data were determined not to be "property" as defined in the Interstate Transportation to Stolen Property Statute, Ribicoff said.

Ribicoff's bill would make all penetrations a federal crime, not just those acts perpetrated with a telephone or by other means across state lines.

Cosponsors of the Ribicoff bill include Senators Charles Percy (R-Ill.), Henry Jackson (D-Wash.), Lee Metcalf (D-Mont.), Edward Kennedy (D-Mass.), Strom Thurmond (R-S.C.), Robert Griffin (R-Mich.) and Pete Domenici (R-N.M.).

### *For Software Programs*

# Contu Unit Says Copyright Enough

**By Don Leavitt**
Of the CW Staff

WASHINGTON, D.C. — "The copyright law, applying as it does to all forms of expression, should be broad enough to shelter the works of Nobel laureates and computer programmers without causing any confusion about which is which."

With those words as the final sentence in its report to the National Commission on New Technological Uses of Copyrighted Works (Contu), the commission's software subcommittee left no doubt as to its basic belief.

Established by Congress late in 1974, Contu was chartered to study, among other things, the reproduction and use of copyrighted works on DP systems and to recommend changes in the law that seem necessary because of the use of such systems. The commission is releasing this report now for public comment.

The dramatic quality of the software subcommittee's words was triggered, perhaps, by the subcommittee's desire to overcome resistance to the idea it sensed on the part of the commission. A footnote early in the report claimed "certain commissioners are skeptical about the need for any form of protection for computer programs as well as the copyrightability of such works.

No such concerns face a subcommittee on computer-based data bases. The discussion in its report to Contu, also just released, "is premised upon the commission's agreement with the legislative intent of the new copyright law to afford copyright protection for computer data bases equivalent with the protection accorded compilations in traditional hard-copy format," the committee said.

Between the footnote and the dramatic ending of the software report, the committee argued that authors of computer programs clearly have a right to protection for their work, that various other forms of protection — particularly patents and trade secrets — are not appropriate for software and that parts of the new copyright law, scheduled to go into effect next year, should be

*(Continued on Page 4)*

# Management Key to Future DP: Spangle

**By Toni Wiseman**
Of the CW Staff

WASHINGTON, D.C. — Management issues are more significant than technological concerns in improving the efficiency of DP activities during the evolution to advanced computer systems, C.W. (Clancy) Spangle said here last week.

Those responsible for implementing tomorrow's systems must be concerned with the overall efficacy of the installation in an organization — and how this is perceived by the organization, Spangle, president of Honeywell Information Systems, Inc., told attendees of the National Conference on Computer Systems Productivity.

"All of us in the profession need to do a much better job in reviewing and explaining the cost-effectiveness of our present systems. If we don't do a better job with today's systems, there won't be any tomorrow," he warned.

Spangle acknowledged that defining "tomorrow's systems" is not an easy task because of the speed at which technology appears to be changing and because there seems to be some divergence of opinion within the industry as to what tomorrow's standards will be.

"Nevertheless," Spangle said, "I believe we can agree that the industry is moving more and more toward bringing the power and the variety of functions that a computer can accomplish out of the machine room and into a workstation where the transactional activity and the business actually takes place — thus making the power of the computer available to ordinary employees instead of just the computer professional."

The goal of these advanced systems is to achieve increased individual productivity, he observed. But, he noted, moving to these new systems can be accomplished only if the task is treated as a management issue rather than a technological one.

*(Continued on Page 2)*

# *Senate Strikes 'Target'*

**By Nancy French**
Of the CW Staff

WASHINGTON, D.C. — The Senate has voted to kill funds for the Veterans Administration's (VA) controversial computer claims processing system known as "Target."

About $17 million of the $21.9 million 1978 appropriation was struck by the Senate Appropriations Committee's Subcommittee on Housing and Urban Development — Independent Agencies, chaired by Sen. William Proxmire (D-Wis.).

The $4,927,000 that remains will be used to continue the pilot project now under way in Philadelphia.

The computer system was proposed for use in servicing the files of 7 million VA beneficiaries who receive monthly benefits, pensions and

*(Continued on Page 4)*

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Please address all correspondence to the appropriate department at 797 Washington Street, Newton, Mass. 02160. Phone: (617) 965-5800. Telex: USA-92-2529

**OTHER EDITORIAL OFFICES: England:** Computerworld Publishing Ltd., 140-146 Camden Street, London NW1 9PF. Phone: (01) 485-2248/9; Telex: 264737. **W. Germany:** Computerworld, c/o Computerwoche GmbH, 8000 Munchen 40, Tristanstrasse 11. Phone: 36-40-36/37. Telex: 5215350. **Asia:** Computerworld, c/o Dempa/Computerworld Company, Dempa Building, 1-11-15, Higashi Gotanda 1-chome, Shinagawa-ku, Tokyo 141. Phone: (03) 445-6101. Telex: J2424461.

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### To Mitigate Confusion

# Societies Urged as Vendor-Victim Liaison

**By Don Leavitt**
Of the CW Staff

WASHINGTON, D.C. — The professional DP organizations must become a truly effective "third force" to bridge the gap between the "vendors and the victims" of the uncontrolled growth of DP in this country, according to Dr. Herbert R.J. Grosch, president of the Association for Computing Machinery (ACM).

Unless the organizations step in effectively, the confusion of the DP community and the disappointments of the end users will continue to grow, Grosch warned attendees at the National Conference on Computer Systems Productivity here last week.

This leads not only to poor systems, but to such things as the "meaningless layers of software" including complex operating systems and "portable, high-level languages" now being implemented on minicomputers, he added.

Even though they often have limited resources, ACM and the other organizations that make up the American Federation of Information Processing Societies (Afips) must handle the dual job of advising users of what they might reasonably expect from systems and of helping vendors understand what the users need.

Only these groups are "intellectually free" enough to do the job, Grosch said.

User groups seem to fit into the gap between vendor and user, he admitted, but "they are often very vendor-oriented, on the one hand, and very concerned about the technical aspects of the products, on the other." They just aren't focusing on the bigger issues, he said.

Vendors don't really care about the users' desire and need for good systems. It is abundantly clear that various vendors have "suborned" the potential effectiveness of an original system to sell more powerful equipment, he charged.

### Hope in Sight

But there is hope. Afips has recently opened a Washington office and, even though it's a small operation now, it's a start, Grosch noted.

It is a place where users can come for objective information and a place from which the professional DPers can perhaps make their views known to government policy makers, he said.

The organizations also have to reach out the other way, however, and get more DPers involved in their operations, according to Grosch.

ACM, he noted, has reached a membership of 35,000 and others generally are smaller. Overall, they now influence a very small fraction of the people really involved in DP in this country.

To broaden interest in their purposes, the organizations must, for example, make their publications more readable or create new publications for a wider audience.

In line with that thought, Grosch noted a feasibility study is now underway that may lead to the publishing by Afips of a "general interest" DP-oriented magazine called *Abacus* with funding from ACM.

The problems of the end users are perhaps illustrated best by the proliferation of "minis, micros and terminals" throughout the halls of Congress, Grosch said. The expectation seemed realistic — to tap information in the Library of Congress and the data bases available to the congressmen.

In practice, however, the users — congressmen and their staffers — struggle hard to learn how the systems work, after which they get "unformatted data from incompatible files, which they have to analyze themselves to get the information they wanted in the first place," according to the ACM leader.

# FTC to Probe Credit Bureaus

WASHINGTON, D.C. — The Federal Trade Commission (FTC) has launched an investigation of computerized credit bureaus to determine if the information they maintain on consumers is accurate.

"The inquiry will seek to determine whether the bureaus are maintaining reasonable procedures to assure accuracy of information as required by the Fair Credit Reporting Act," the FTC said in a news release.

The agency refused to indicate which credit bureaus were under investigation, but noted the inquiry would be limited to "automated" bureaus.

"On the basis of information obtained, the commission will determine whether further action to enforce the Fair Credit Reporting Act on a nationwide basis is necessary," the FTC said.

A spokesman said the investigation was being brought as a result of complaints filed by individual consumers. The probe is expected to take six months to a year.

Depending on the extent of violations, if any, the FTC can make a public complaint against an individual company, propose a standard for operation or report to Congress with proposed legislation, the spokesman explained.

# Management Key to Future DP

*(Continued from Page 1)*

Many users today have a very high-speed, powerful, latest generation computer which is not being used efficiently because it's doing exactly what was done in the past with the old machine, Spangle observed.

"On too many occasions people just do a surface conversion, don't use the new capability and continue running a big batch workload on a highly terminal-oriented interactive system that just doesn't run a batch workload as well as the old system," the HIS executive said.

"Data processing technology already is far in advance of what is being realistically used and tapped. The very real problems are organizational, operational, logistical, human and political - in short, management issues," he emphasized.

Spangle said the real key to the success of tomorrow's computer system is in the quality of thought that goes into its design, installation and implementation; the level of receptivity that is created for it; and the degree of familiarity achieved by both the people who operate the system and the customers it serves.

### Old-Fashioned But Good

Some of the old-fashioned solutions to management problems still are valuable in the most modern systems. Nothing beats proper training including — or perhaps starting with — training from vendors, Spangle said.

"But don't fall into the trap of thinking you can get all the training you need from vendors," he cautioned. "They won't tell you anything about your internal applications, your own workload that's on the machines or your own procedures.

"Remember that there is a body of training and documentation that you must do for yourself — and if it's not done properly the system will come down or be used inefficiently," he advised.

"It comes back to the premise that management of a data processing system is a process, not an event — it is always being tuned and improved," Spangle said.

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# SWEEPSTAKES

## How did SyncSort do against IBM's new sort in OS? It was like one of those old horse-race movies!

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"The sorts are coming onto the track now. There's IBM's highly touted young colt, with his jock clad in the software stable's traditional colors — blushing pink and envy green.

"Will ICEMAN 3 — out of old SM-1-5740, Release 2 — stage a comeback today? Will he be able to make up for his disappointing finishes in the earlier MVS and VS Classics? Only time will tell.

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"How this tousle-headed youngster has struggled to train and develop this magnificent animal, and bring him from dusty county-fair tracks to the bigtime of sort racing! Shirley is, of course, clad in the familiar Whitlow colors — denim blue and tee-shirt white.

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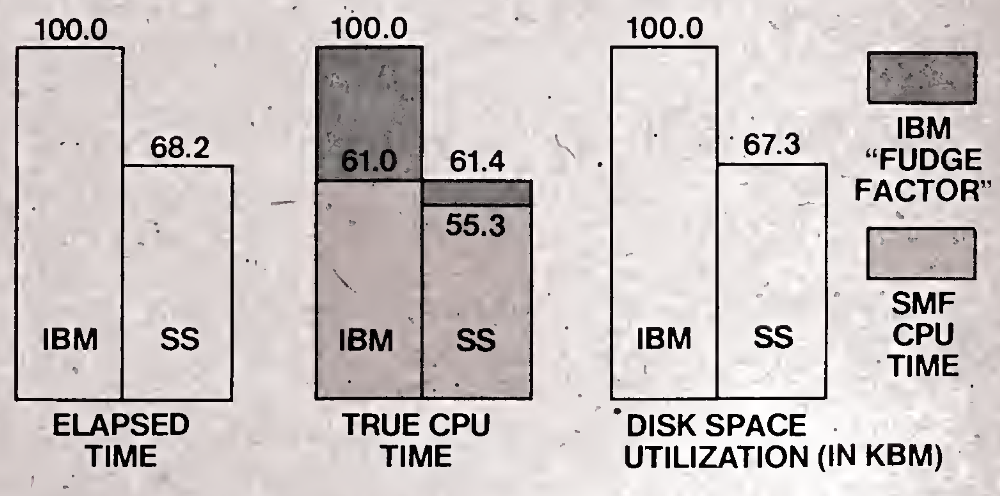
* * *

We're sorry, but after that everything reverted to modern *cinema vérité.* SyncSort breezed home first without even working up a lather. Here's how the results were posted on the flashing board at Benchmark Park:



Actually, SyncSort would have won by more lengths if it hadn't been for that old, one-eyed race-track judge — SMF. As you probably know by this time, being an experienced "improver of the breed", SMF records only a portion of the True CPU Time that a sort consumes.

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# Author Hersey Says Copyrights Meant for Art, Not Technology

**By Don Leavitt**
Of the CW Staff

WASHINGTON, D.C. — Computer programs should not be protected by copyrights, according to well-known author John Hersey, who disagreed with the majority of software subcommittee members of the National Commission on New Technological Uses of Copyrighted Works (Contu).

In a long paper distributed with the software committee's report, Hersey, a Contu member, questioned whether programs qualify as "works of authorship" and argued that protecting programs by copyright might have an undesirable impact on the national culture.

Hersey urged Contu to consider whether any additional protection for programs is needed. If it is, he asked the 12-member commission to consider a new form of protection outside copyright. A draft of a model statute, expressing that option, is attached to Hersey's dissertation.

In the body of his essay, Hersey stated emphatically, "Programs are different from the various forms of 'works of authorship' secured under the constituion by copyright."

Each program may be considered a writing of an author up to a certain point in its development, he acknowledged, but "beyond that point the same program is embodied in material form and becomes a *mechanical device*, which is engaged in the computer to become an essential part of a mechanical process.

"Thus the computer program is something strikingly new in our culture," he said, adding later that 'every program has but one purpose and use . . . to control the electrical impulses of a computer in such a particular way as to carry out a prescribed task or operation. In its object form it does not describe or give directions for mechanical work. It does the work.

"A true writing has never before done work in this way — no matter how fervently many an author may have wished his words could 'do' something," he said.

Even if the first stages in the life of a program, when it is often in human-readable form, might be considered copyrightable without any change in the present law, the "working" stages cannot be granted that protection. That would preclude the possibility of copyrighting the whole, Hersey argued further.

### Cultural Concerns

Moving to cultural concerns, the author noted the commission's view that "the dual purposes of copyright are the encouragement of creative work and the wide scattering of its fruits.

"The sanctioning of copyright protection for this new thing . . . would, in this view, tend to dampen the first purpose. Its impact on the creative community would be bound to be discouraging . . . this pollution of copyrighted 'writings' with units of mechanical work would affect not only the creators but also the consumers of the culture.

"The distinction is not between Nobel laureates and computer programmers [as the software subcommittee suggested in its report] . . . it goes to the distinction between human beings and machines," he added later.

The draft statute provided by Hersey differs from copyright in one essential respect: It is drawn specifically to protect both the expression and the innovative ideas involved in the creation of computer programs, he explained. It establishes, he said, a "reserved territory" between copyright and patent, which has aspects of both but is neither.

The Hersey draft calls for a protection period of 10 years, which he said is "far more suitable for computer programs than the much longer term of protection of the copyright law. The 10-year term would give the innovator an edge without being so long as to deny the public the cumulative worth of the knowledge involved."

The draft includes the means by which rules can be adapted to the changes in technologies for operating computers "which are bound to have more far-reaching and wrenching consequences" than changes in the technologies of conventional copyrighted works, Hersey said.

## Contu Asks Comments

WASHINGTON, D.C. — In publishing the reports of its subeommittees on data bases and on software (see Page 1), the National Commission on New Technological Uses of Copyrighted Works (Contu) also asked for public comment on the documents.

The commission will base its final report to the President and Congress upon response to the documents it said, as well as on further public hearings and the results of "several" studies now in progress concerning the economic, public interest and consumer questions associated with the issues before the commission.

Copies of the reports are available free from the commission. Request and comments on the reports — due by Sept. 1 — should be addressed to Arthur J. Levine, Executive Director, National Commission on New Technological Uses of Copyrighted Works, Washington, D.C. 20558.

The subcommittee reports were also published in the June 23 issue of the *Patent, Trademark and Copyright Journal*. Reprints are available for $5 from the Bureau of National Affairs, Research and Special Projects Division, 1231 25th St. N.W., Washington, D.C. 20037.

# Unit Calls Copyrights Enough

*(Continued from Page 1)*

altered to clear up technical difficulties related to software.

Changes in the law are needed because of the way in which progams are used. Loading or inputting a program into a computer constitutes making a copy and, under present working of the law, copying is the exclusive right of the copyright owner.

One part of a new section of the law proposed by the subcommittee is designed to make it clear that inputting a program by a rightful possessor is not an infringement. Another part permits a user to make a copy of a program as backup protection in case something happens to the original copy.

But the subcommittee is aware of limitations in the protection provided by copyrighting even if the suggested changes are made in the law.

"It should be emphasized that the protection which would be afforded programs by copyright would not serve to block the use of a program's basic concepts by others since copyright never protects ideas, but only the expression thereof," it said.

Further, "when specific computer instructions, even though previously copyrighted, are the only and essential means of accomplishing a given task, their later use by another will not amount to an infringement," the report contended, citing a court decision related to use of a lawyer's copyrighted language as analogous.

Copyright protection for programs would "indeed be 'thin,'" the subcommitte acknowledged, "because in the programming field the use of specific language — instructions — may, in some instances, be so basic, essential and integrated with the underlying idea that use of the same language [by someone else] would not constitute infringement."

Although most programs have shorter useful lives than the full term provided by the copyright law — 75 years — there is no need to treat software as unique in this respect. "No one is harmed when short-lived works remain protected beyond their brief periods of utility," the report said.

Getting down to details, the subcommittee recommended that notice, deposit and registration regulations be promulgated by the Register of Copyrights. The fact that programs tend to be updated more frequently than other copyrighted material may lead to changes in the normal "deposit" rules, but these should be relatively minor, the software report added.

In its report, the data base subcommittee also faced the question of how the copyright law could be implemented with respect to big and ever-changing data files. Again, the answer seemed to be that the law as it stands could handle the job fairly well.

Largely because of the constant change inherent in computerized data bases, the group urged the Register of Copyright to work out rules that would allow the deposit of the complete data base at the time of original copyrighting, but permit updating through submission of "identifying material" rather than actual copies of the "new" data base.

# Funding for Target Voted Down

*(Continued from Page 1)*

education payments.

When fully operational, the $122 million proposed system will comprise a central computer system and three regional centers as well as 79 minicomputers and 2,500 terminals spread throughout the VA's local offices [CW, May 2].

Despite the Senate action, all or part of the funds may be restored in conference between members of the House of Representatives and Senate when they convene the week of July 11, according to a Senate spokesman, since the House earlier approved the full request. The measure was defeated for a number of reasons, he noted.

First, the benefit/cost ratio got worse and worse, the spokesman said. For every $1 spent, only $1.19 would be saved, according to the VA's projections and then only as long as the VA stayed on its implementation schedule.

Secondly, the size of the project seemed "unduly large" since the workload of the system continues to decline, particularly in the area of Veteran's educational benefits.

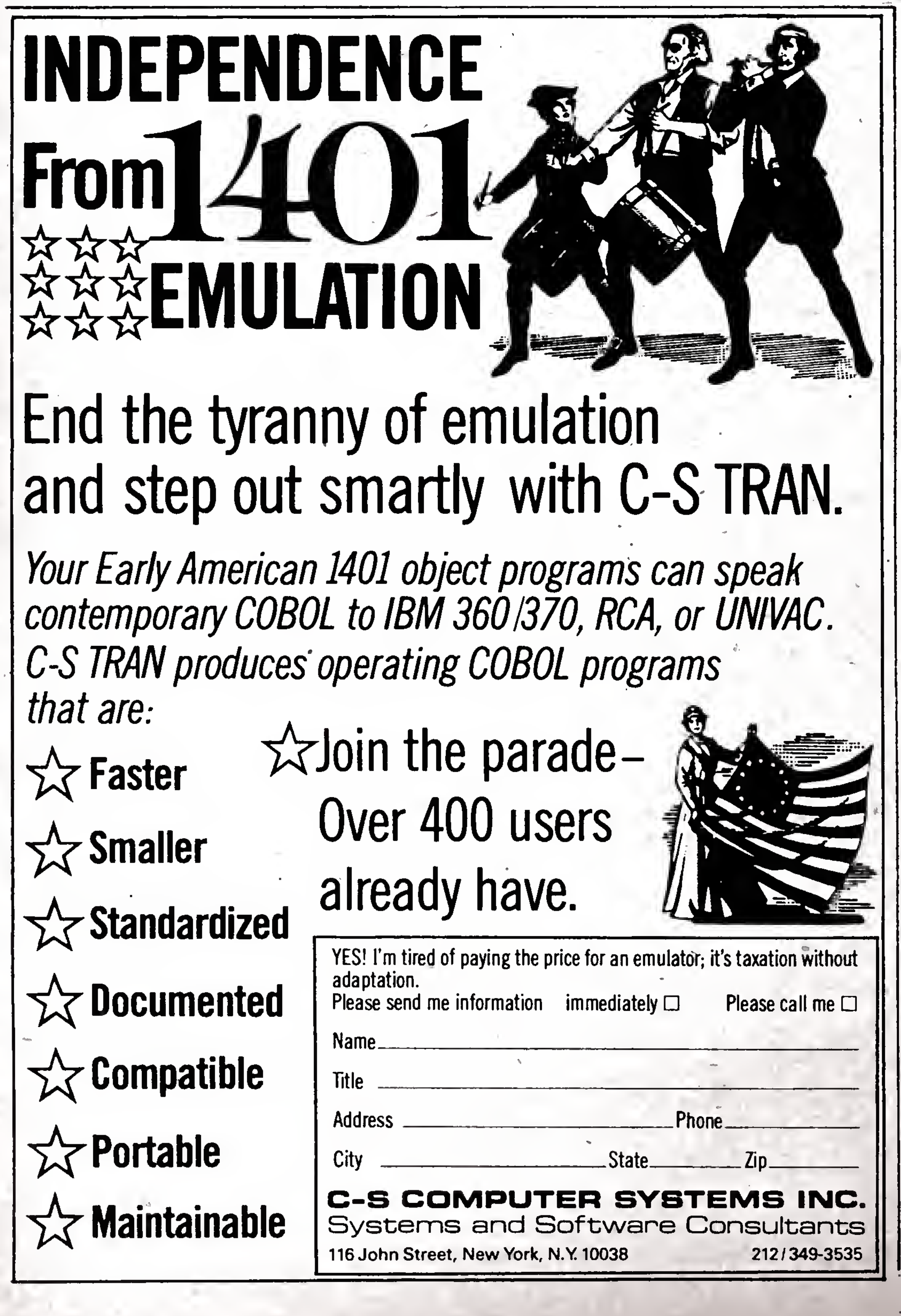
Further, at the time the Senate acted, the VA still hadn't developed a comprehensive plan that identified all the critical tasks to be accomplished under the project, he said. The VA "rushed up" a critical tasks list at the last minute, but its effort came too late for consideration, he indicated.

The VA is "hopeful" that funds will be restored in conference, according to Bill Martin, under whose department the proposed system would be operated.

"However, if the Senate vote prevails, Target is effectively destroyed because the request for proposal would have to be withdrawn and we'll have to go through the entire [procurement] cycle again," Martin, chief data management director, said.

Martin said the VA has responded to a General Accounting Office report that was critical of several aspects of the Target system's development, in a report that has yet to be officially released.

"I think we have adequately dealt with all those issues raised," he added.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# Windy City Programmer Wins Code-Off in Big D

**By Nancy French**
Of the CW Staff

DALLAS — A Chicago man topped the field of 47 entries in the first "programming tournament" held here recently in conjunction with the National Computer Conference.

The contestants in the four-round affair included high school and college students, but most were entrants drawn from the ranks of professional programmers and were selected from 65 original entrants based on programs they had submitted.

First prize went to William T. Bailey, a programmer/analyst for Standard Oil of Indiana in Chicago. Second place went to Saul Rosenberg, a programmer and "general troubleshooter" for Riverside Research Institute of New York.

Third prize was won by Thomas M. Bogner, whose most recent job was instructor at Jamestown Community College in Jamestown, N.Y. The fourth prize winner was Bernard M. Chester, manager of computer resource OR/MS at Dialog, Inc. of New York.

Fifth place went to William A. Sherertz, chief systems programmer for Blue Cross/-Blue Shield of Michigan in Detroit.

Each of the four rounds was designed to test one particular programming skill, according to Ed Rodriguez, associate professor of computer science at East Texas State University, who, as NCC special activities chairman, ran the tournament.

In Round One, the 47 contestants who started were asked to complete a general multiway merge on the program each had written as contest entry so that it could handle duplicate keys. Contestants were allowed one hour to study the problem and two hours work on a terminal; 25 contestants were eliminated.

In Round Two, the 22 remaining contestants were asked to debug a data validation program containing logic errors. The same amount of time was given as in Round One.

In Round Three, the nine remaining contestants were asked to modify a program they had not written. The task was to generalize a poker hand evaluation program to permit any number of players and implement a discard and drawing new card feature. Again, one hour of study time and two hours of work time was allowed.

In Round Four, the six remaining contenders were asked to write a program from scratch — to produce frequency tables for cryptographic analysis of a coded message.

One hour of study time and three hours of work time was allowed.

The contest was run on the Dallas Independent School District's Time-Sharing Service, based on a Burroughs B6700. Terminals were donated by Computer Devices, Inc., Anderson Jacobson, Texas Instruments and Telex Corp.

As first prize winner, Bailey was awarded a TI Silent 700 Model 745 terminal, $500 worth of time-sharing services from Tymshare, Inc., a two-year subscription to *Personal Computing* magazine and a plaque commemorating the win.

Second prize winner Rosenberg won a Hazeltine Modular 1 CRT terminal and a one-year subscription to *Personal Computing* in addition to a plaque.

Third prize winner Boger won a Computer Automation, Inc. Naked Mini with LSI4/10, a one-year subscription to *Personal Computing* and a plaque.

Chester, as fourth prize winner, won an Informer Model D77 CRT terminal, a one-year *Personal Computing* subscription and a plaque.

For coming in fifth, Sherertz won Datapro Research Corp.'s three-volume Datapro 70 Information Service, the subscription to *Personal Computing* and a plaque.

Semifinalists won such prizes as a one-year subscription to *Computerworld*, NCC proceedings and a choice of books from Prentice Hall.

# Two Univac Managers Accused of Using DP For Fraud, Conspiracy

PHILADELPHIA — Two program managers have been indicted for mail fraud and conspiracy while allegedly using computer time without the knowledge or consent of their employer, Univac.

David E. Kelly and Mathew Palmer Jr., the two charged with the crime, set up a music rearranging business last year, called Camps, Inc., and solicited nearly 70 companies for business.

The two programming managers allegedly used nearly $144,000 in computer time and storage from Univac facilities, the indictment charged.

Allegedly using a Univac 90, the two were able to revise music into digitized form, selectively edit the music and print out any desired format, according to a spokesman for the Federal Bureau of Investigation (FBI).

The men have been charged with five counts of mail fraud and one count of conspiracy.

Mail fraud is a common statute used in these cases, the FBI spokesman said. "It's a tried and true federal law whereas there is no specific state or federal law for computer cases."

The indictment stated nearly 417 music programs were stored using a CPU, terminals, operators and three-fourths of the allotted storage time given to Kelly's group. Univac would not comment on the case.

Both men are represented by J. Shane Creamer, former district attorney for Pennsylvania, and have pleaded "not guilty."

If convicted, each could be jailed for up to 30 years and fined up to $15,000. No trial date has been set.

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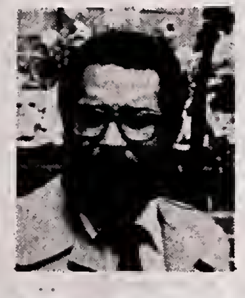

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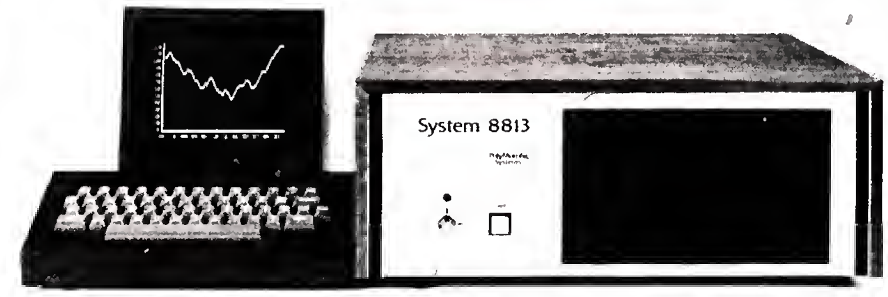

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# Wisconsin Levies Software Tax Despite Revenue Overestimation

**By Molly Upton**
Of the CW Staff

MADISON, Wis. — Gov. Patrick J. Lucey last week signed into law a budget bill that levies a 4% sales tax on DP services, despite the fact the Wisconsin Department of Revenue overestimated by about 56% the revenue yield from such services.

The tax goes into effect Aug. 1.

Nick Nichols, deputy secretary of the Department of Revenue acknowledged in a memo to State Rep. Gary K. Johnson, cochairman of the Joint Committee on Finance, that the revised estimate of the revenue yield from the tax is $9.9 million rather than $17.5 million.

The overestimation, pointed out by Michael Zeidler, a computer consultant [CW, June 13], stemmed from including as a basis for revenue calculations the $3.7 billion in revenues state officials thought mainframers received for services in 1975.

This figure should not have been included in the calculations since it represented estimates of the entire DP industry, Nichols pointed out after questioning International Data Corp., a research firm, on this point.

Although the Legislature considered several motions to delete this provision from the governor's budget proposal, the lawmakers decided to include it, primarily for reasons of consistency, according to State. Rep. R. Michael Ferrall, assistant majority floor leader.

The sales tax law currently applies to "some but not all sales of computer and DP services," Ferrall wrote in a letter to Zeidler.

"This situation may lead to confusion as to what is and what is not taxed. This proposal would impose the sales tax more uniformly on DP services," he added.

Furthermore, "some aspects of computers services are similar to forms of data transmission which are presently subject to the sales tax such as telephone and intrastate telegraph services," he pointed out.

# DP-Based Toxin Tester Gets Patent Office OK

WASHINGTON, D.C. — A computer-based instrument designed to instantly identify toxic substances in fluids and thus save the lives of victims of poison or drug overdoses was patented here recently.

The "video fluorometer" was invented by James B. Callis and Ernest R. Davidson, both of the University of Washington in Seattle.

The device, which is based on fluorescence spectroscopy — the study of light emitted by an excited sample as it luminesces — is said to be able to profile a complex substance in .017 of a second.

The system works by first amplifying the light from an excited sample with a low light-level television camera. The camera signal is processed by a computer and displayed on a video screen as a three-dimensional graph or topographical display.

The substance is identified by matching the pattern created by the chemicals in a sample with chemicals stored in the computer.

In addition to its obvious use in the medical field, the system could also be applied industrially where quick analysis of unseparated substances is needed, such as substances involved in oil spills, according to Callis.

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## School Reduces Consumption by 22%

# DP Monitor Gets High Grades for Controlling Energy

**By Ann Dooley**
Of the CW Staff

FORT LAUDERDALE, Fla. — South Plantation High School here learned it could reduce its energy consumption by as much as 22% per month in an experiment with computer control.

Electricity bills had reached $5.2 million in the city schools last year and officials wanted something done about that.

So, the Broward County school board and the city of Fort Lauderdale set up a computer monitor in a few city buildings and one school to determine how much money would be saved under a computerized system.

Based on a Data General Corp. Nova 2, leased through Automated Data, Inc. of Miami, the control system delivers power only to areas of a building where it is needed.

Instead of turning the air conditioning on hours before the students arrive, the computer was programmed to activate the cooling system at the latest time possible without causing any discomfort to the students when they come in, according to Mario Gutierrez, the school board's mechanical director.

The system also shuts off the air conditioning for a few minutes every hour. The shut-off period is not long enough for the rooms to warm up noticeably, but it does save on electricity output significantly, Gutierrez said.

In addition, the computer is programmed to be aware of what rooms are empty during a lunch period or other hours during the day and to regulate the temperature accordingly.

### Cooling Monitored

Previously, the air conditioning would run until the janitor finished cleaning all the rooms, Gutierrez said. "In essence, we were cooling off rooms at 3 p.m. that weren't going to be cleaned until 10 p.m. that night," he explained.

The present system allows each room to be cooled for set amounts of time, but only when the room is in actual use, he added.

"We had to work together very closely with the school to find out [its] schedule and coordinate everything," Gutierrez said.

"It took about 10 days to get the building in shape for the computer," he said. Equipment had to be adjusted and made compatible with the computer link.

Then, everything had to be analyzed to determine what kind of power load had to be controlled including the distribution of the power going to the air conditioning system, exhaust fans and equipment maintenance systems, he said.

### Conservation 'Critical'

At South Plantation, the air conditioning was found to account for about 55% of an average $10,000 monthly electric bill.

The need for energy conservation is "critical", according to Jack Moss, county commissioner. Moss said he intends to ask the commission to fund an energy management survey of electricity use throughout the county buildings.

Exact figures on energy consumption at certain city buildings are not available, according to Moss. But based on the performance of Automated Data's system and others like it, "we could save at least 20% of our electricity bill by hooking major equipment into a computer," he said.

### Savings Pay Expenses

The reduced electricity bills will pay for Automated Data's expenses within 20 months, according to James Buening, vice-president for that company.

Automated Data has worked mainly with hospitals and hotels in reducing energy consumption, and the Fort Lauderdale buildings are its first attempt at public buildings.

Although the company sells a stand-alone energy management system, Fort Lauderdale officials are leasing a Nova 2, located off-site. The system is linked via phone lines to a remote control panel unit at the school and city office buildings.

### Panel Controls Usage

The control panel has 24 control points that regulate the energy usage. It receives and decodes signals sent from the Nova 2 and activates or deactivates energy at any certain area.

The panel can also generate signals back to the Nova to indicate the electrical status at any moment. The entire system can be overridden at any time and opeated on a manual basis, Gutierrez added.

In Florida, air conditioning is a major source of consumption, but the computer also regulates the elevators, hot water tanks, intake fans and parking lot lights, he noted.

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# Data Retrieval Calmer Without COM for Patent Office

**By Esther Surden**
Of the CW Staff

WASHINGTON, D.C. — Although the resident experts said "it couldn't be done," the U.S. Patent Office has solved a mind-boggling data retrieval problem that involves accessing a data base of "about 12 million patent documents in 95,000 subclasses." The solution was switching from computer output microfilm (COM) to a minicomputer.

"It is very important for the patent office, patent attorneys and the general public to know where a particular patent is classified," Jeffrey L. Forman, director of the Documentation Practice and Systems Division, said. "Making that information available has not always been easy."

However, the number of documents and subclasses in the patent office files is just the tip of the iceberg, Forman explained. The classification system is a dynamic one with approximately 600,000 documents . . . reclassified into new categories each year. Thus the classifications printed on the front page of each patent when it is issued cannot be relied on to reflect the actual status of that patent, he said.

Prior to installing the minicomputer, the patent office had maintained three separate files. Information on patents in a subclass could be obtained either from microfilm or in the form of a paper listing made from a weekly run of the files maintained by the patent office's Office of Computer Services, Forman explained. The classification of a particular patent number could be obtained through a "minicomputer-controlled microform display," he said.

In addition, two master sets of files were maintained — an examiner's search file that contained "unofficial cross-reference" patents (patent copies that, over the years, examiners have placed only in their own search files) and the public search room file.

Getting information on patents in a subclass from microfilm required determining which one of an 11-reel set contained the desired subclass and then searching that reel to find the subclass. The list of numbers for that subclass and notation as to whether the patent was an original or cross-reference were displayed in a dense, hard-to-read format that could only be run out on low-quality paper, Forman said.

The subclass listing run was on good, readable paper but it was not time sensitive enough, he added.

### Retrieval System

The microform retrieval system, used in the public search room and to respond to in-house telephone inquiries, was a minicomputer coupled to a microform display. Users keyed in a patent number and the COM system retrieved microfiche, positioned to the correct dot on the strip. This fiche area, however, contained 100 patent numbers and classifications and was hard to read. It also suffered from mechanical breakdowns. Updating the system was time consuming so it was frequently out of date, according to Forman.

The experts at the Office of Computer Services told the documentation division that the files were too large to be accommodated on a minicomputer. However, the division continued its quest and came up with a viable system, Forman stated. "We relied on contractor personnel who are more expert to bring different systems to our attention," he noted.

The office chose a system based on a Four-Phase Systems, Inc. minicomputer with custom software developed by Commercial Software Systems Corp.

"One of the major factors in the equipment choice was the disk capacity that could be made available to us. We have to be able to take the master file and load it into the system in two different sequences," Forman noted.

The IV/70 processor acccommodates 120M characters of disk storage. Seven remote CRT terminals are tied to the mini.

"As an examiner or classifier tells the patent index person the patent for which he desires classification information, the patent index person keys that number into the terminal," he said. A readable display shows the patent number including the alphabetic subclasses in which it is classified in the examiner search file. This was the first phase of implementation.

### Wider Information

Implementation of another phase of the system enabled the office to key a class and subclass into a terminal and get a screen display of all the patents in that subclass. The display also indicates whether the patents are originals or cross-references in that subclass.

The patents are displayed in pages of 15 patents, starting with the most recently issued, and the user can move to the next page or any desired page by keying in a number, he said.

The system also produces subclass lists, a function taken over from the large-scale patent office computer, he said.

All classifications are stored in an abbreviated address code form. "Therefore, each time you key in a patent number, the disk is being used not only to locate that patent number and its coded classifications, but also to retrieve the formatted class and subclass corresponding to each of the address codes," Forman explained.

"A terminal user interacts with the system under program control with messages and prompts displayed on the CRT," the software vendor said. "The system checks all keyboard input, diagnoses errors and allows rekeying if necessary. Because a separate copy of a program is loaded into the processor's memory for each user, different users can select the same or different capabilities. Only the required program elements are loaded."

The operating system features dynamic program relocation, enabling different sized programs to share memory, the company added.

## Raytheon Funds Scholarship At Tufts to Honor Marshall

MEDFORD, Mass. — Raytheon Co. has established a scholarship at Tufts University here in honor of Dr. Laurence K. Marshall, a founder, president and chairman of the company.

Income from the grant will provide financial assistance to a student in the College of Engineering who has achieved academic excellence and who has demonstrated interest and accomplishments in other fields of study.

Raytheon was first conceived by Marshall and Charles G. Smith in a discussion on the Tufts campus 55 years ago. The third founder was Dr. Vannevar Bush, a roommate and 1911 classmate of Marshall at Tufts.

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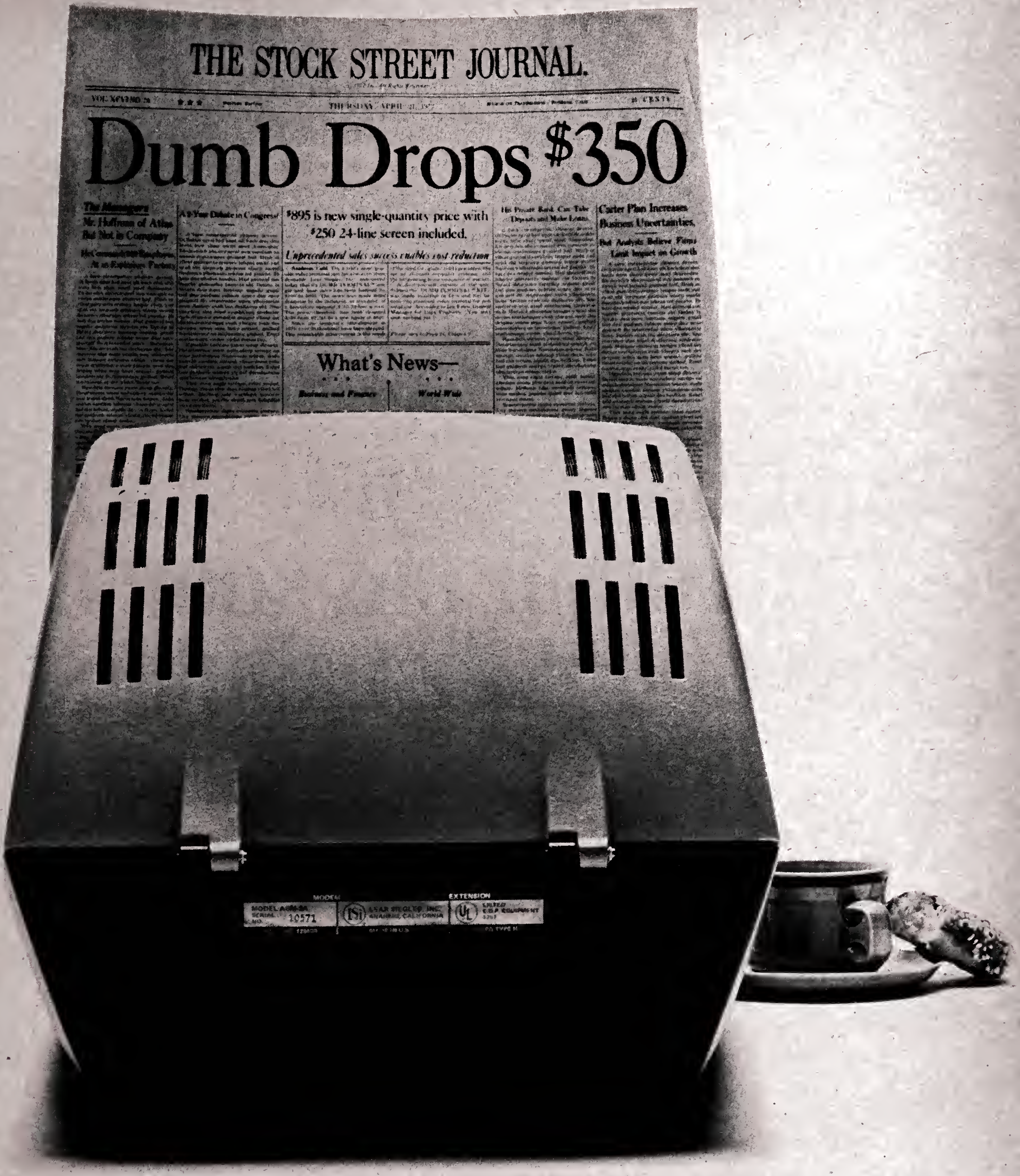
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CW-7-77

# What Basic 4, DEC, Microdata, Data General, etc. should know about distributors.

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# The Waves of Change

## By Charles P. Lecht

*What does tomorrow hold for today's users? Lecht believes it holds design changes that will make system architecture more adapted to end users and problem solving. This week, in the latest excerpt from his soon-to-be-published book, Lecht discusses what those changes will be in the early 1980s and how IBM will incorporate them in its next generation, the System/80.*

### CHAPTER VIII

Future data processing hardware is expected to be more specialized and significantly more modular than it is today. "Generalized" local hardware components (common system building blocks) will be *dedicated* (i.e., distributed special-function units) for communications, computation, control functions, data-base management and for other specialized tasks.

These specific task-oriented modules or process engines will be dynamically combined according to application processing requirements, interconnected and linked via software and firmware to form the system.

Moreover, remote distributed functions and processing networks (as contrasted with local distribution) will permit various users to control their own local equipment, but a central DP staff must still have responsibility for development, maintenance and coordination of the corporate DP strategy, corporate data base and general (interdepartmental) applications software and standards.

Processing will move out closer to the end user; if one processor or engine fails, the entire organization will not be brought to a standstill.

Systems will be simple and easier to use in this more remotely distributed environment. The user will be able to focus more on the desired logic and solutions than on the processing techniques needed to achieve them.

The major systems suppliers will create a data base/data communication environment in which users have greater control of their data and develop their own special uses for the data; however, in the full function of data base management, data must be carefully characterized either as a corporate resource or only locally meaningful.

As a Future Requirements Study recently presented by the Guide (IBM 370 users group) Future Division put it, "Management is crying out for DP systems which are more usable. Managers like to manage, and they feel uncomfortable with present-day DP systems which are so complex that they defy understanding . . . defy management

. . . we can look for users to be more knowledgeable, more demanding and much more involved in specifying the systems from which they derive benefit." New applications should soar when the end users become more involved.

"User-oriented" systems will require changes in the traditional design of computers. The data management function, or "system resource repository and controller," will become the focal point of the system or network of systems, and the processors (CPUs) will play a more "peripheral" role.

"Problem solving" systems will evolve in such a way that hardware and software details or idiosyncrasies become unimportant to end users.

With high-speed, broad bandwidth data communications available, the system itself will determine how and where processing is done and storage maintained. Operators will make fewer decisions as "secure" operating systems take complete control of the system resources.

Ease of use is perhaps the No. 1 objective. Innovative and complex software, firmware and hardware structures will be required to attain and support this objective. Hardware and software will be strongly interrelated as users become more and more dependent on the systems to assist or guide them in the solution of even the most mundane problems.

#### Two Network Approaches

Under the network concept, "intelligence" will be available in peripherals and terminals, as well as controllers and processors. (Terminals provide multiaccess capability to a computer network. Even a sensor may be considered a terminal since direct access to a computer is provided.)

Figure VIII-1 depicts the current, "traditional" machine organization. All parts of the system are clearly identifiable by the user. In the network systems of the next decade shown in Figure VIII-2, the user has access to a limited number of terminal devices. The balance of the hardware and the communications capability becomes essentially transparent to the users. Communications linkages of varying capacities connect the various nodes of the network.

Another approach to a network is shown in Figure VIII-3. Here, regional centers control several local centers. Data banks for general-purpose use are concentrated only at the regional centers, with broadband communications links between these centers.

The local centers are connected to the regional station via remote job entry stations and terminals. Local centers thus become satellites to the larger regional operation.

Such an organization of systems/capabilities permits a decentralized system to have some of the advantages of centralized, concentrated data bases. It should be emphasized that although remote subsets of data bases or special, unique files are available at the terminals, our judgment is that it will be impractical and inefficient to decentralize the *total* corporate integrated data base by as early as 1980.

The distribution of total corporate data bases will not generally be realistic because communication costs are still too high; large disk files will remain relatively expensive; and concurrent file updating and maintenance is too complex in a distributed data base environment.

In addition, data base security and privacy can be more easily implemented and controlled if the sensitive corporate data base is distributed over fewer locations.

#### Future System Architecture

More on-line, communications-oriented, transaction-oriented and real-time systems will evolve as these systems become easier to use, as privacy and security concepts are proven and as systems become more reliable and dependable.

Systems of the 1979-84 period will exhibit such characteristics, although their growth will continue to be restricted by AT&T communications tariffs and line inefficiencies (until AT&T can fully implement digital networks, or until IBM communications satellites and private branch exchanges [or PBXs] become operational).

In short, system architecture in the early 1980s will be more adapted to end users and problem solving. One can anticipate that IBM's System/80, along with systems developed by other major innovation-minded vendors, will exhibit the following charac-

(Continued on Page 12)

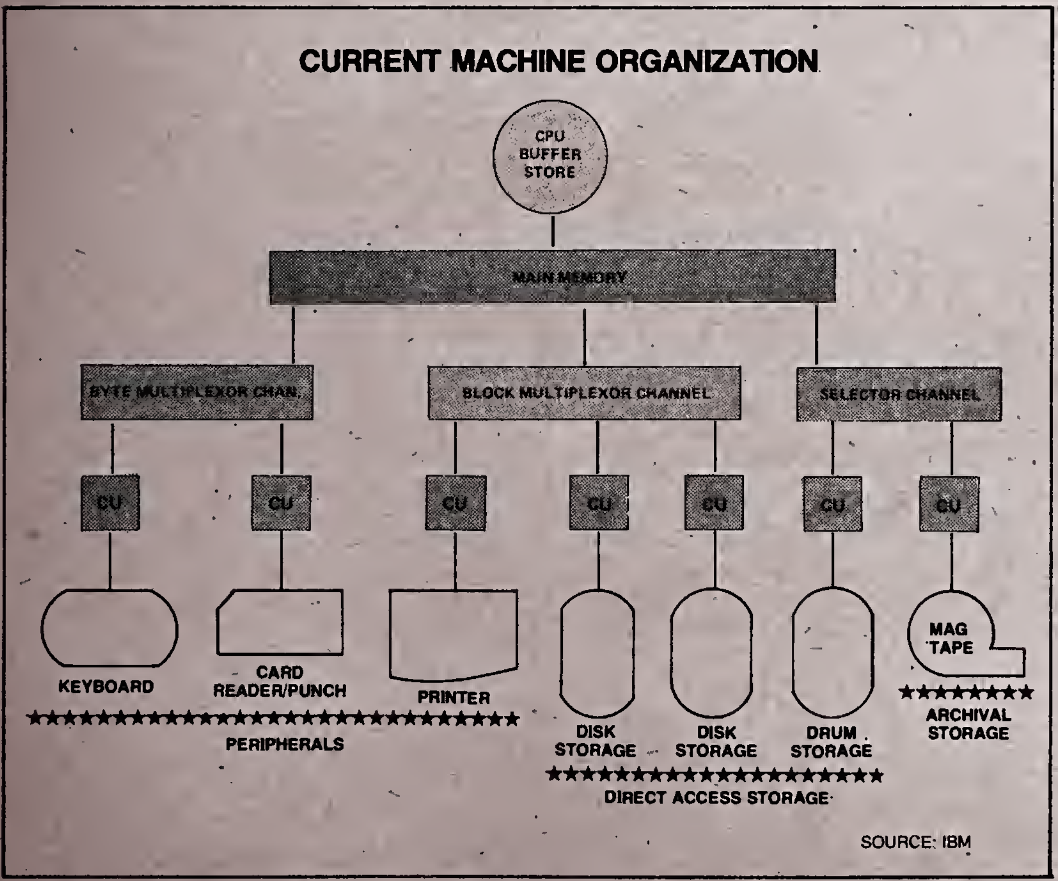


Figure VIII-1

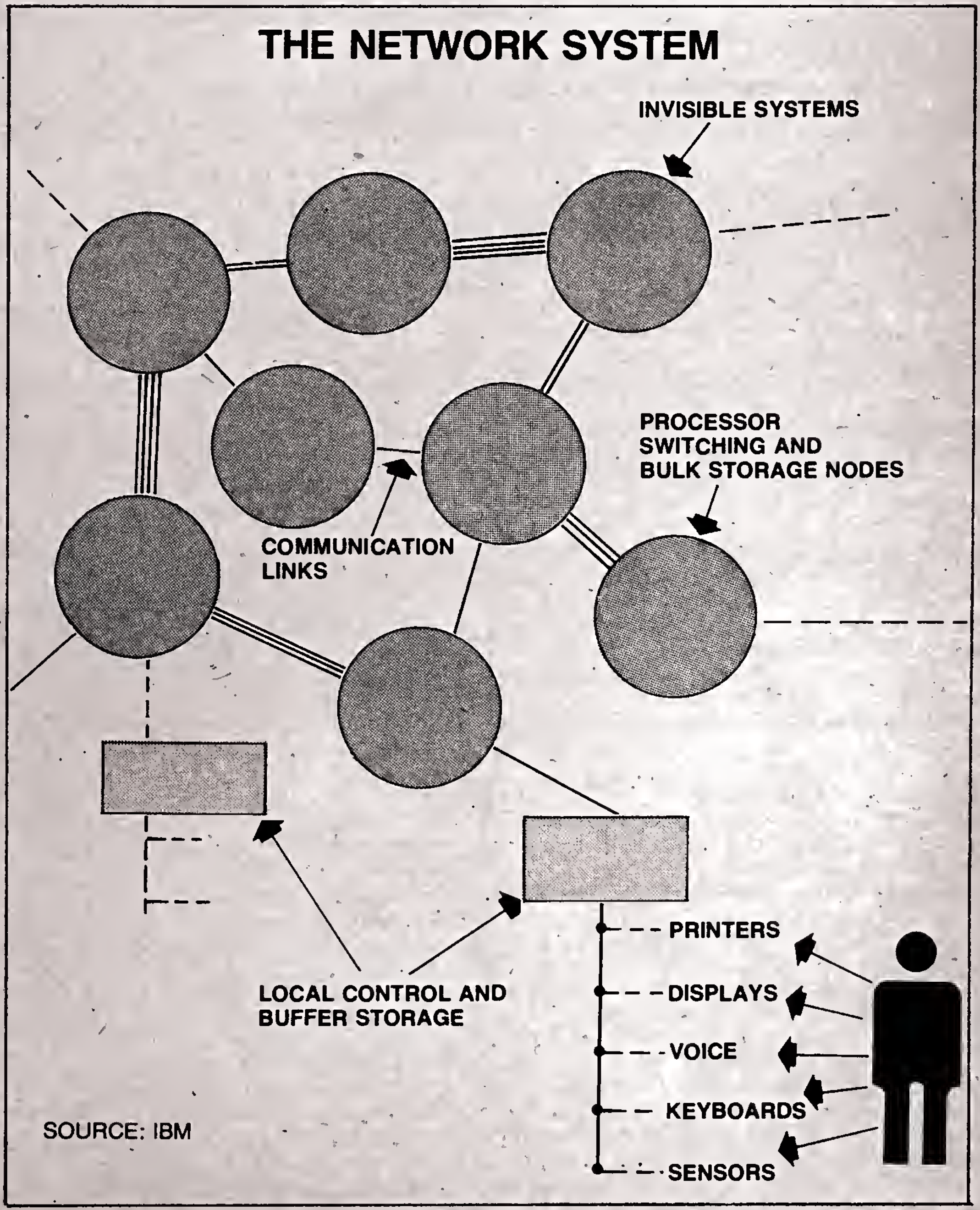


Figure VIII-2

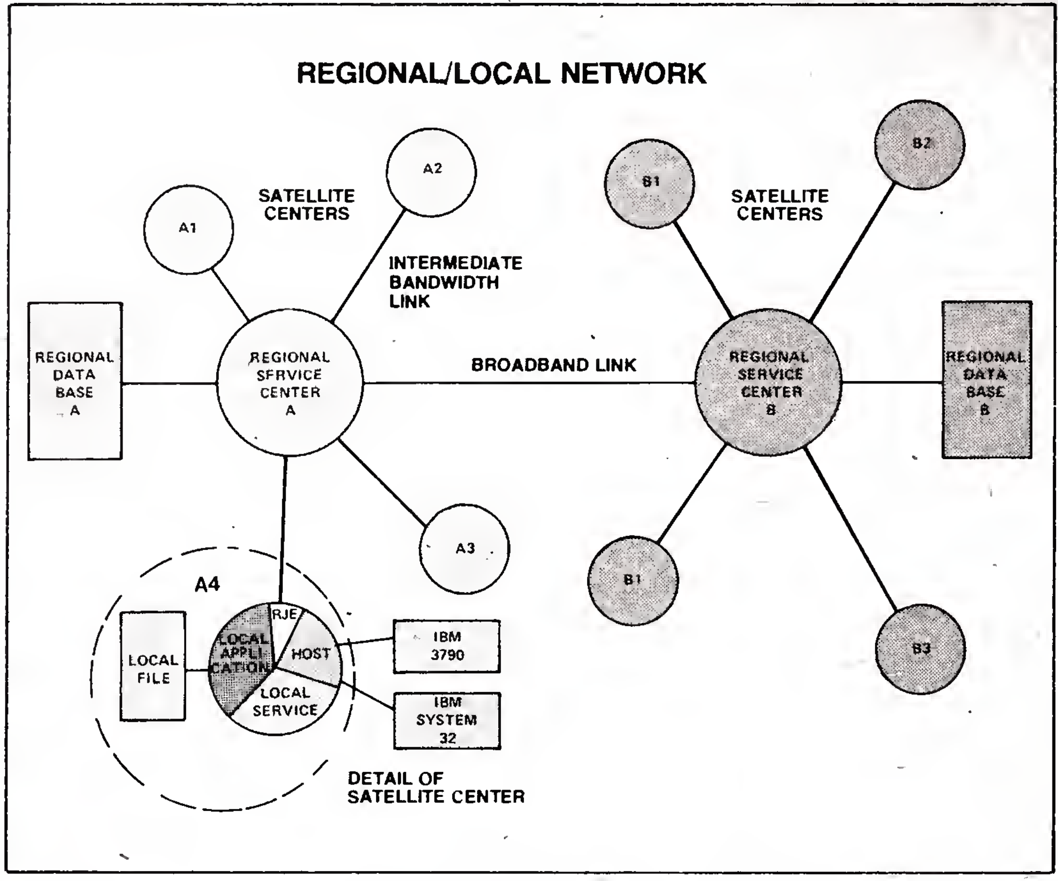
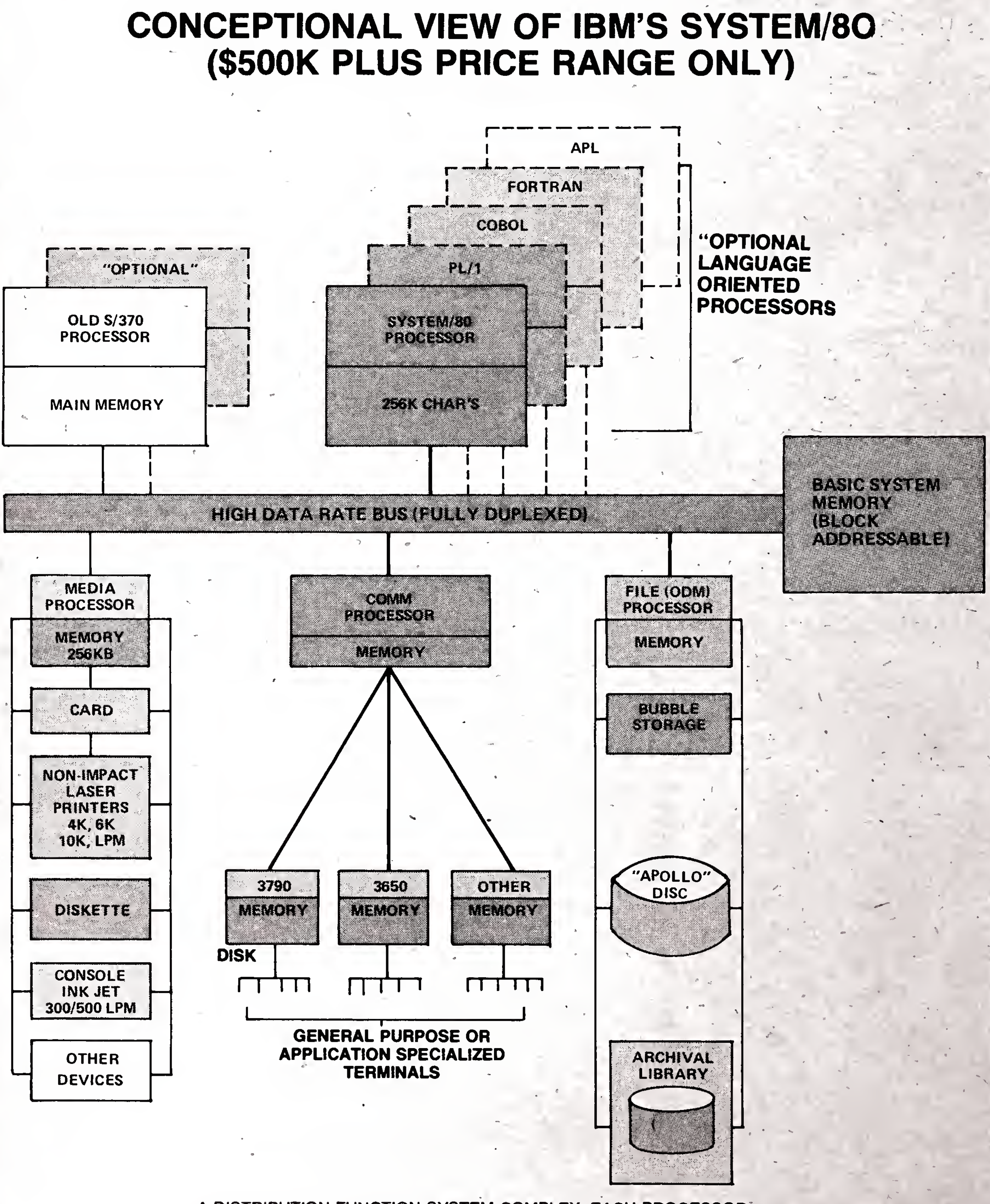


Figure VIII-3


CONCEPTIONAL VIEW OF IBM'S SYSTEM/8O ($500K PLUS PRICE RANGE ONLY)
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COBOL
PL/1
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"OPTIONAL"
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MAIN MEMORY
SYSTEM/80 PROCESSOR
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HIGH DATA RATE BUS (FULLY DUPLEXED)
BASIC SYSTEM MEMORY (BLOCK ADDRESSABLE)
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MEMORY 256KB
CARD
NON-IMPACT LASER PRINTERS 4K, 6K 10K, LPM
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A DISTRIBUTION FUNCTION SYSTEM COMPLEX. EACH PROCESSOR IS TAILORED (VIA MICROCODE AND SOFTWARE) TO PERFORM SPECIFIC FUNCTIONS.

Figure VIII-4

*The System/80 'represents a radical architectural departure from previous general-purpose 360 or 370 designs. However, from the standpoint of the user software interface, the architecture would appear to be upward-compatible.'*

*(Continued from Page 11)*

teristics in support of end-user objectives in the coming decade:

1. *Distributed special-function processors:* Instruction stream processors (IP), file processors (FP), media processors (MP), communication processors (CP), sensor or event processors (SP) and a supervisor processor will be provided. Special array or vector processors and essential emulators will also be available.

2. *Interpretive processing capability:* For the program development environment, high-level microprogrammed IPs which execute source code (such as PL/I, Cobol, Fortran and APL) directly will be provided. "Standard" native mode IPs will also be available for the more performance-conscious, production-oriented users. (We already see examples of this interpretive processor or "engine" with the IBM 5100 and APL assist feature for the Model 148.)

3. Multiprocessing: Multiple main IPs will be supported and each process engine will be adapted by read-only memories (ROM), programmable ROMs (Prom) or writable control stores to execute a particular high-level language subset or superset. The non-interpretive, native mode IPs will execute in-line code at internal speeds which are approximately four times current performance levels.

Merged transistor logic (MTL), also known as MPT, with propagation delays approaching 5 sec or 50 nsec at the 1K device level, will likely be used to achieve these speeds.

4. *Memory hierarchy:* most process engines should utilize their own private high-speed cache (buffers) as well as up to 256K characters of integrated main memory, and all engines will be able to share a larger (over 100 million characters) secondary or bulk MOS storage.

(In this context, it should be noted that "bytes" has been dropped from most IBM 370 documents, and the System/80 "character" may be defined on a dynamic basis, i.e., consisting of 4, 8, 9 . . . n bits depending on the function to be performed.)

Backing up the shared MOS memory will be bubble storage. All four levels of storage (i.e., Cache, MOS, bulk MOS and bubbles) will transfer data blocks or pages automatically, probably based on a "hard-wired," frequency-of-usage replacement algorithm.

5. *High-speed, wide band bus:* All the local system resources and process engines will exchange data and communicate with each other via a unique wide band, multiaccess bus. The characteristics of the main bus are uncertain at this time, but IBM and other vendors are known to be working on "fiber optic" I/O techniques which use a solid-state laser source.

6. *Input/output interconnection:* A single multiplexed wire (coaxial cable) or loop (dual loops will be optional for redundancy) operating at very high speed will replace today's numerous cables. This loop system will also permit moving more intelligence in-board, in effect replacing the "channel" function with special integrated I/O processors.

### Functional Overview

A conceptual diagram illustrating the probable structure of System/80 with all the distributed special function elements is shown in Figure VIII-4. (Note that names given to a particular "box" are my own labels. Obviously, IBM's specific model numbers will not be known until announcement time.)

This represents a radical architectural departure from previous general-purpose 360 or 370 designs. However, from the standpoint of the user software interface, the architecture would appear to be upward-compatible.

The "process engines", e.g., APL, Fortran, Cobol and PL/I, are microprogrammed and interpretive; i.e., they can execute source code (except for the native mode, 370 and Fast Fourier processors which may represent more tailored or optimized engines).

In our conceptual view, System/80 would function approximately as follows: jobs are submitted locally or remotely via card readers, diskettes, consoles or terminals to the *media processor* or through the *communication processor* (and passed on to the media processor) for preprocessing.

During this preprocessing, workload queues are created; required system resources are schedueld; data files are requested; and data relationships are established within the outboard data manager (ODM), or "system resources repository," and the particular interpretive processors (for development work) or native mode processors (for production work) are allocated as required.

When all the necessary system resources

*(Continued on Page 13)*

> *'The System/80 operating software will pull the various hardware, microcode and software elements together into an efficient "information-processing system." . . . The major requirement is that it be usable by both professional programmers and the general public.'*

*(Continued from Page 12)*

are queued or scheduled, the job streams or tasks are sent to the *basic system memory* (BSM), i.e., the common, sharable memory, to await execution. As the required special-purpose or native process engines become available, tasks are blockloaded from BSM to the faster, private process memory (this memory will probably be 10 times faster than the BSM).

All required library routines, files and data relationships at this time have already been established and prestaged onto more efficient BSM or (if necessary) to bubble storage *prior* to the actual task execution step. At this point the main process engines (Cobol, PL/I, etc.) will execute the tasks to completion.

Should higher priority activities or real-time events interrupt task execution before termination, then the entire task and its status is temporarily swapped back to BSM for later processing and eventual termination.

If the current system workload mix is primarily application development-oriented, e.g., Cobol, then some or all of the process engines could be loaded by the supervisor processor with "Cobol micrologic," which is optimized for program development, testing and/or debug analysis. (In other words, the system *dynamically* adapts its resources to the current workload.)

In many situations, tasks will not require any allocation of native or interpretive processors at all; examples include file maintenance, extraction, reporting or inquiry. In this case the ODM, media processor or communication processor (three functions which, in fact, may be combined in a single box) will be able to handle such tasks without interrupting the main process engines.

We can find some examples of this off-line special-function engine capability today in the IBM 3850 mass storage system control design.

This dynamic adaptation and linkage of resources (logic, control storage and microcode, main memory and I/O devices) to suit the particular process load is substantially different from current-generation, general-purpose time-sharing or multiprogramming concepts. The special-function, locally distributed engines provide dedicated resources for each type of task (this does *not* preclude reentrant or concurrent use of specific resources) and do *not* attempt to interleave this task with other different tasks.

For example, a Cobol and Fortran compile process would not coexist or have to be multiprogrammed within a single engine.

Another major type of "process engine" may be what I would call the "macro processor" that is optimized for execution of production-oriented, native machine code. After source programs have been fully checked out using the interpretive processor(s), software (compilers) would be optionally available to convert user programs to native object code.

Naturally, many jobs, especially in a university or research environment, are one-shot types which may never need to be converted to more efficient object code. Array processors or Fast Fourier analysis "engines" represent another form of specialized, microcoded processors which execute object code.

### Potential Advantages

Some of the potential advantages of the above-described System/80 conceptual design include:

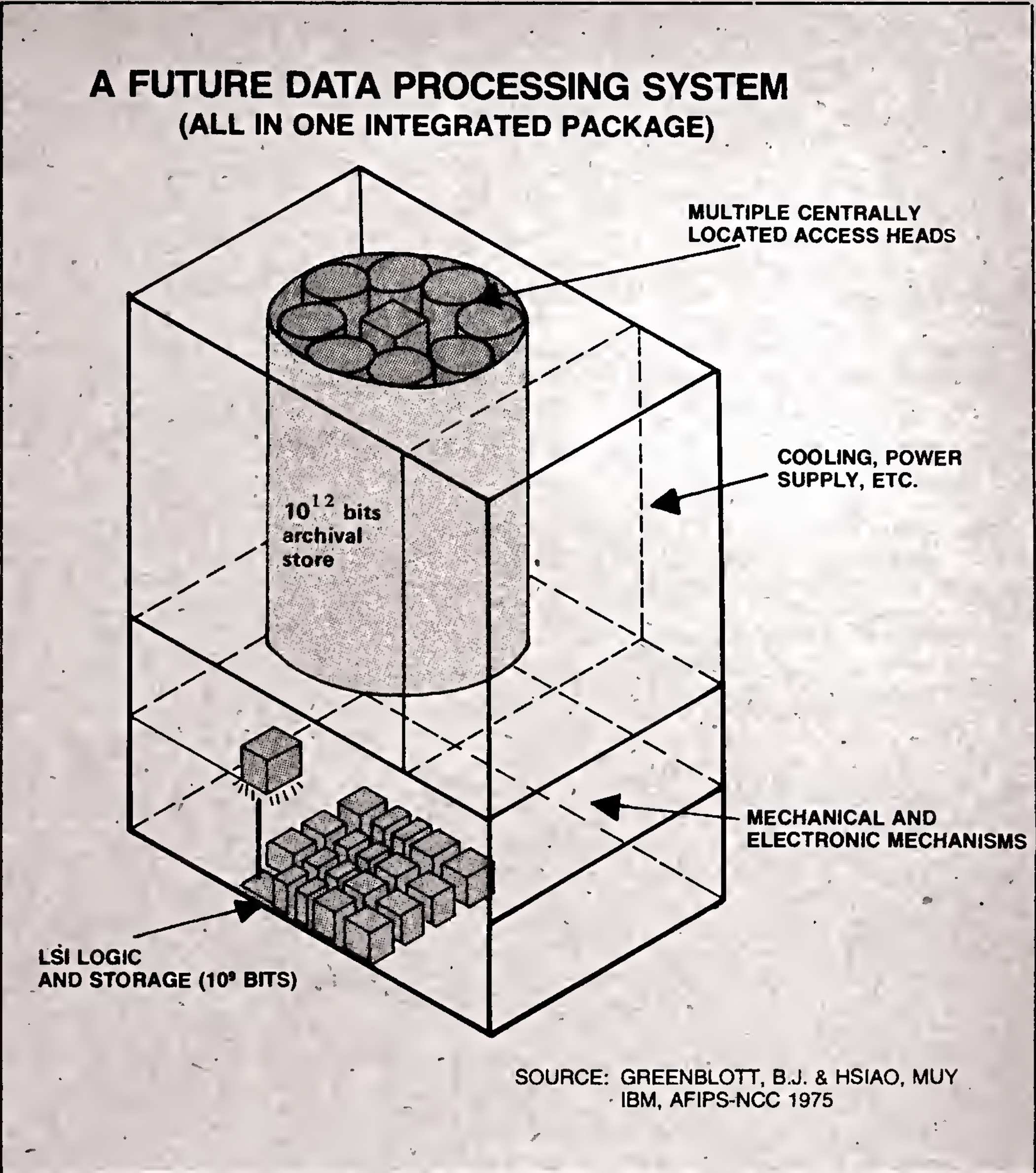
- The distribution of supervisory functions — the special processors may simplify operating system control requirements and reduce overhead.
- Better system balance and resource utilization because of the system's automatic "adaptive" characteristics.
- Increased overall performance because of hardware or firmware (microcode) implementation of many frequently used software functions.
- Improved system security and integrity capability arising from functional isolation.
- Simpler and easier data access, since the system resource repository or ODM handles most data requests and relationships.
- Highly modular design for future expansion and growth; e.g., additional IPs, CPs, ODMs and SPs can be added as the workload increases in smaller steps.
- More cost-effective redundancy ("fail-soft") capability.
- Easier conversion via interpretive processors and emulators.

How will the IBM System/80 be packaged? One possible structure is illustrated in Figure VIII-5, where everything is integrated in one total package. The advantages of this packaging include lower reproduction cost; more difficult plug-compatible replacement of individual components; and lower space requirements.

### System Software

The System/80 operating system will pull the various hardware, microcode and software elements together into an efficient "information-processing system." The software for System/80 is the key to the reorientation in systems thinking. The major

*(Continued on Page 14)*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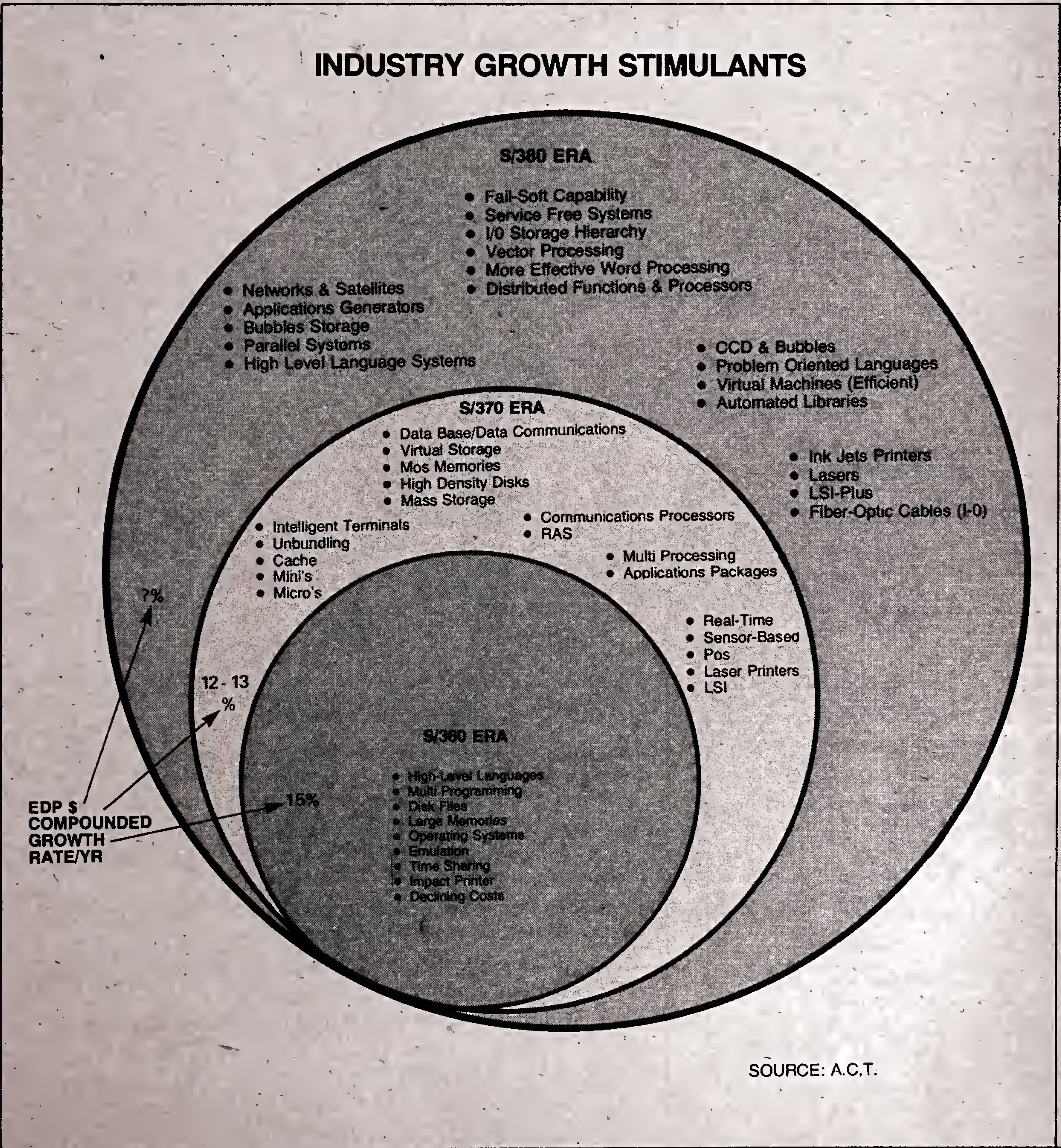
MECHANICAL AND ELECTRONIC MECHANISMS
LSI LOGIC AND STORAGE ($10^9$ BITS)

SOURCE: GREENBLOTT, B.J. & HSIAO, MUY IBM, AFIPS-NCC 1975

Figure VIII-5



SOURCE: A.C.T.

Figure VIII-6

# The Waves of Change

*(Continued from Page 13)*

requirement is that it be usable by both professional programmers and the general public.

According to the IBM trial documents (in the Telex case), "The system must be usable by people who are not programmers, not professionals, not college graduates and not necessarily high school graduates." For the professional, extensions in languages, data handling and system facilities would need to be made.

To meet the requirements of nonprogrammers, on the other hand, an IBM study group recommended the following:

1. "A layman's language to facilitate system use."
2. "A general-purpose query update language (a subset of the layman's language)."
3. "A Common Command Language by which, with equal facility, operators may effectively manage both simple and complex installations."
4. "Language facilities that emphasize simplicity for the user, provide inherent tutorial capabilities (e.g., leading by hand, etc.)."
5. "Facilities to implement occupational or problem-oriented languages . . . based on industry terminology."

### Programmer Features

The professional programmer would have new features with which to work, including:

1. "Extensions to current languages to facilitate the implementation of data independence, the identification of parallelism within programs, the variable binding of programs to system resources and [the provision of] data flexibility to meet [future user] requirements."
2. "Expansion of compilers to provide interactive execution for computer-assisted problem solving, program development and debugging."
3. "The introduction of all new functions via the primary higher level languages of the marketplace."
4. "Minimization of the requirement to use lower level languages for new functions."

What does all this really mean? The basic thesis is ease of use and support for the concept comes from the necessary program strucures. The end result is that the program restrictions of the past will be reduced or eliminated.

Some additional system software goals are outlined below:

- User orientation

  Nonprogrammers, executives, nonprofessionals

  Bridge gap between man and machine

  Unify all system software

  Reduce maintenance and support required
- Availability

  Isolate users from each other

  Correct minor system anomalies
- Opacity

  Divorced from hardware concerns
- Greater user security and privacy
- High-level languages only
- Migration and coexistence of new and old

  Eliminate forced conversion
- Higher level of reliability, availability and seviceability (RAS) "like a utility"

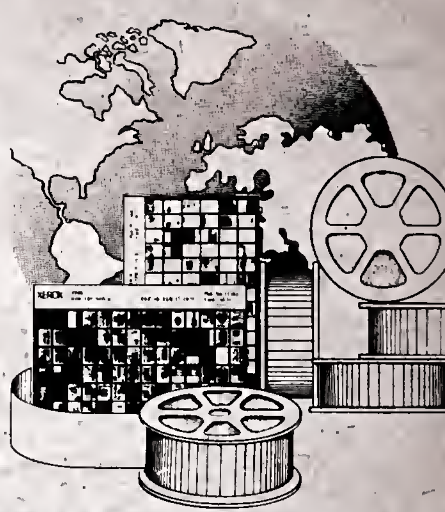
  Failure detection, isolation and bypass

  Automatic restart and journaling

  Automatic reconfiguration
- Multiprocessing support
- Computer networks support

*Lecht is the author of four previous books on computer-related matters:* The Programmer's Fortran II and IV, the Programmer's Algol, The Programmer's PL/I *and* The Management of Computer Programming Projects.

*He is president of Advanced Computer Techniques Corp., which he founded in 1962, and has lectured widely for such groups as the Association for Computing Machinery, American Management Association, American Society for Information Science and Data Processing Management Association.*



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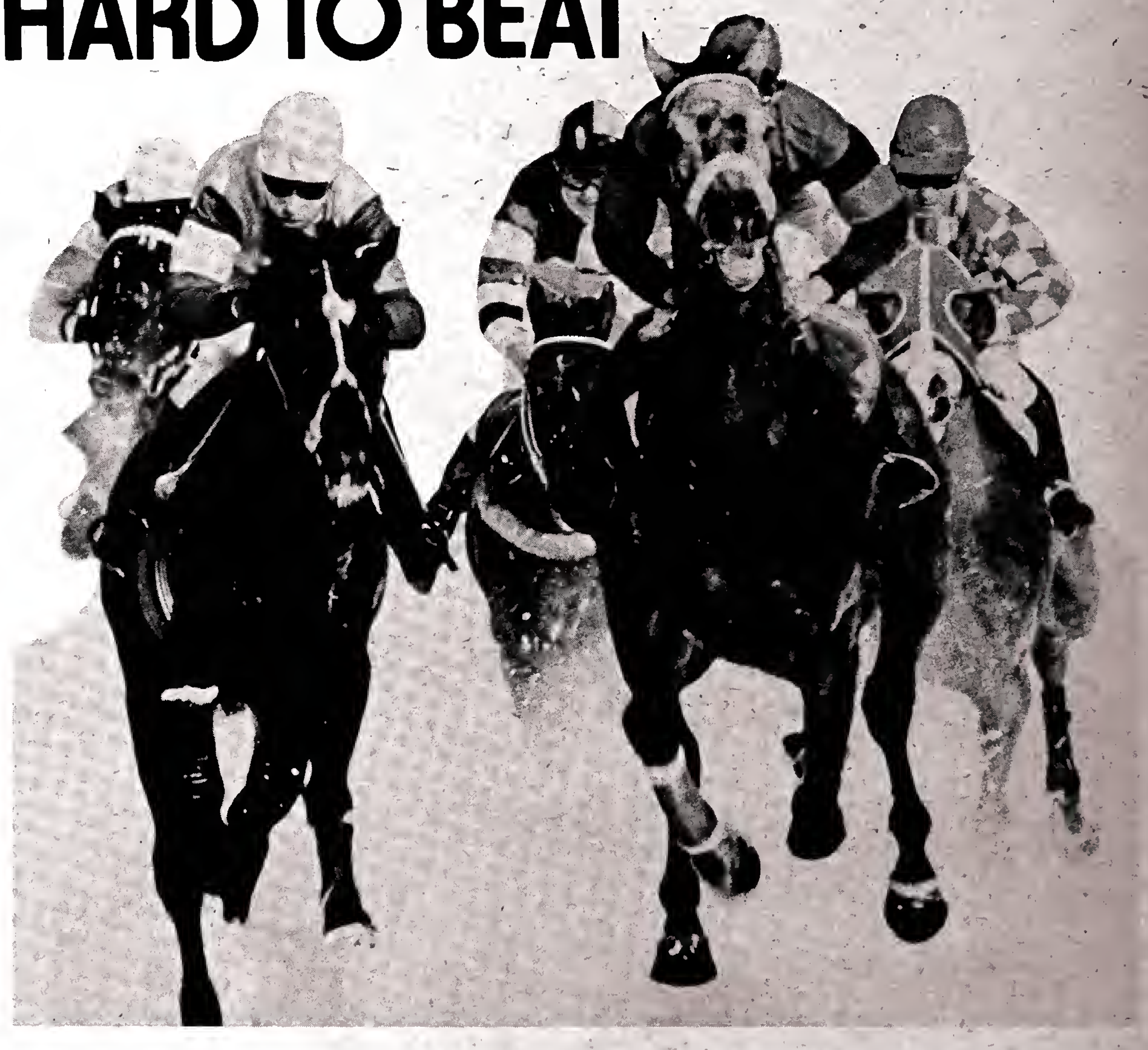

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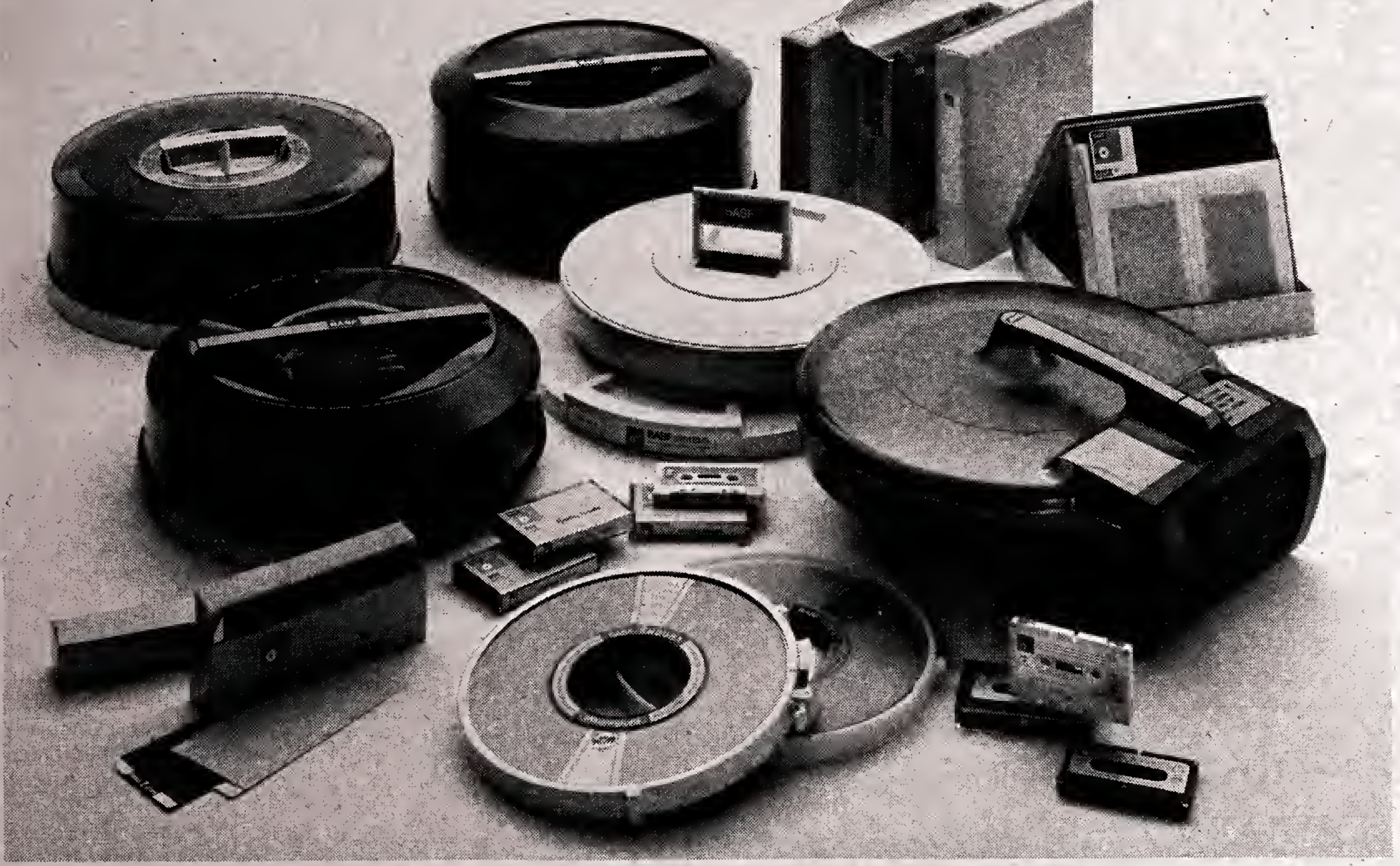

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# Editorial

## A Mini Plea for Help

Are minis really taking over the DP world? The survey below is designed to help us find out.

We'd like to know how widespread the use of minis really is and how people are buying and using them.

Take a few minutes to help us answer these questions. The results of the survey will be published in a future issue of *Computerworld*.

Just fill out the form and return it to us in the prepaid envelope provided in this issue. Mark "Editorial" on the outside.

1) What class of small system do you have?
(a) small business system (b) minicomputer (c) supermini (d) distributed processing system (e)other ____________________

2) How many small systems do you have?
____________________

3) Please identify the systems by manufacturer(s) and model(s). ____________________

4) Do you have a large mainframe? Which one?
____________________

5) Do you use your mini(s) for single or multiple applications? ____________________

6) Would you rather (a) do your own programming (b) get outside programming help or (c) purchase a turnkey system? ____________________

7) What was the major criterion that made you decide on this particular system (or systems)?
(a) Word of mouth (b) ease of programming (c)throughput (d) price/performance(e) software capability (f) vendor reputation (g) other ________

8) How would you rate your vendor's hardware maintenance? (a) excellent (b) good (c) poor Why? ____________________

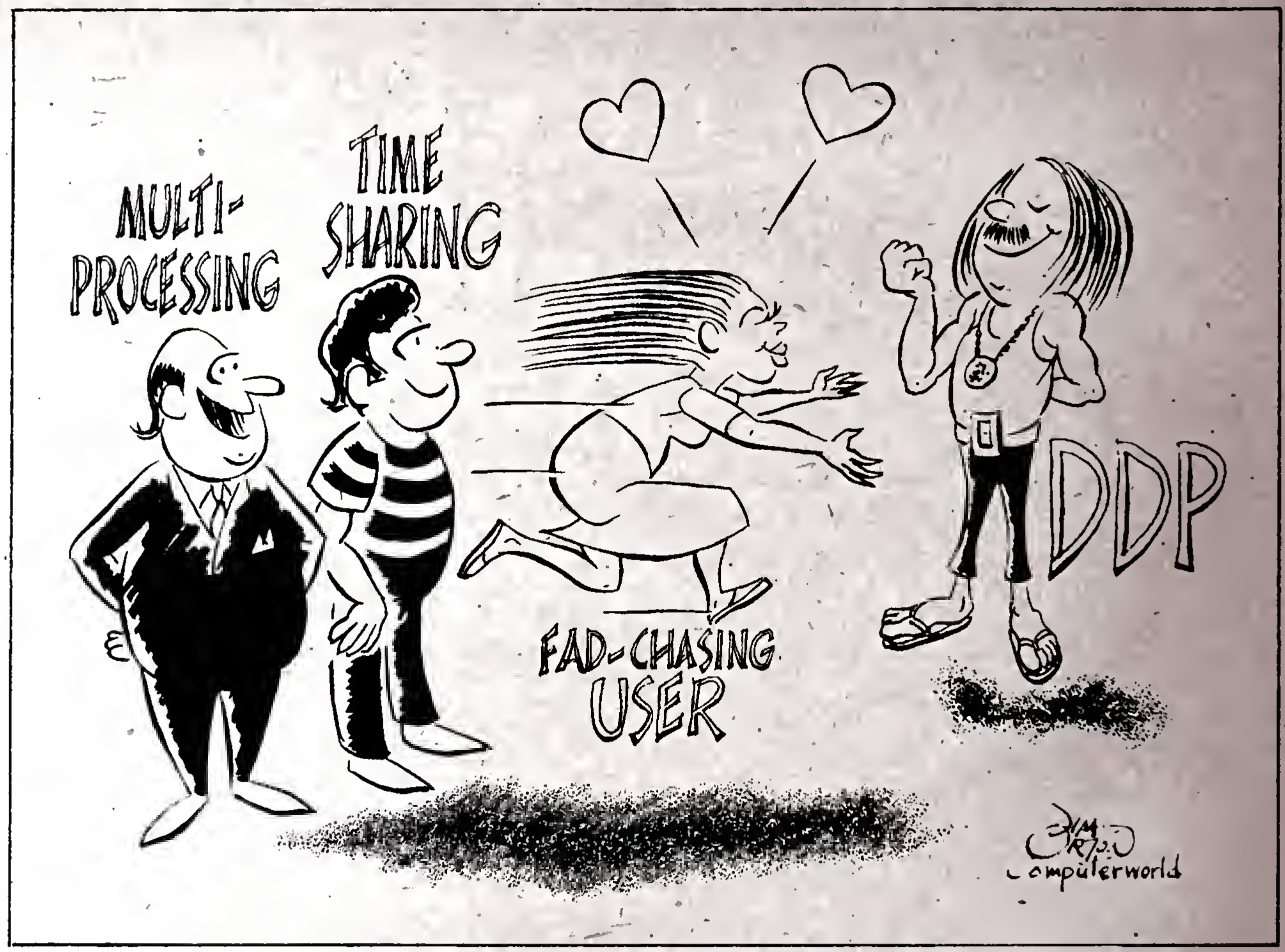
9)How would you rate the software support you have received from your vendor? (a) excellent (b) good (c) poor Why? ____________________

10) What will you do when you "outgrow" your present small system? (a) grow into a mainframe (b) get a larger mini (c) offload the system with another small system (d) other ____________________

11) Is the final purchasing decision about minicomputers made by (a) an end user department (b) central purchasing department (c) central DP department (d) other ____________________

Comments ____________________

Optional
Name ____________________
Company ____________________
Position ____________________



*'He Has Some Crazy Idea It's Gonna Last . . . '*

# Letters to the Editor

## Some Exciting Micro Developments Deprived of Adequate Coverage

I just finished reading the June 20 issue of *Computerworld* that included a number of reports on the National Computer Conference. I am very surprised that it appears that you have ignored some of the very exciting microprocessor developments.

I am thinking especially of the PET microcomputer system introduced by Commadore, which delivers a complete 1K Basic system for $800.

The computer industry seems abuzz with this development and many of us in the computer industry are very excited and hopeful that this is an exciting portent of things to come. To find no mention of it in your June 20 issue seems a little unusual.

I guess this wouldn't seem quite so strange if other people had not called to my attention in the past that CW seems to somewhat ignore the micro field. This came up last when the Microcomputer Fair was held in San Francisco and there was no apparent mention of it in your publication.

I should let you know that one reader is wondering why you are ignoring such an exciting new field. I hope you will give more news to the microcomputer developments; otherwise some of us may not renew our CW subscription and will renew our subscriptions to *Byte*, *Personal Computing*, etc.

Gary Carlson
Provo, Utah

## On Protecting the CDP

I have held my Certificate in Data Processing (CDP) since 1965, but have not been particularly active in any of the many organizations for DPers and industrial engineers. It grieves me, however, to see the members of a profession, who should be proud of its achievements and its future, scuffle over trifles.

This is not the mark of professionalism.

Kenniston W. Lord Jr.'s item in the issue of June 20 ["Your CDP Designation May Become Outdated Unless You Speak Up"] caused me to offer my thoughs on the subject of multiple examinations in every conceivable facet of DP.

The thoughts were originally expressed in a letter to the Society of Certified Data Processors in response to a questionnaire on attitudes towrds this and other related subjects. It is not often that I agree with Ken's ideas, but in this instance I am with him 100%.

If you want a device for tradesmen to boast, "I am a certified ______" (fill in the blank with programmer, coder, data base specialist, keypuncher, computer operator, systems analyst, computer auditor, etc. ad nauseam), then by all means provide a batery of tests.

But, if you want recognition for true data processing professionals, follow the lead of the accountants and provide a single examination reinforced by educational and experience requirements which will identify the professional and distinguish him from the journeymen.

Do not cheapen what so many have worked so hard to obtain.

John J. Mason
Hillcrest Heights, Md.

## In Defense of Best Interests

Contrary to a reference in the article entitled "DOD May Soften Stance for Standard on Channel-Level I/O" [CW, May 30], IBM has never said its I/O channel interface was technologically obsolete.

We are opposed to its adoption as a Federal Information Processing Standard because we believe creating this type of standard can deny the federal user of future technological advances, which is clearly not in the best interest of the user, the government or the computer industry.

J.S. DeBlasi
Director of Standards
IBM
Armonk, N.Y.

*Computerworld* welcomes comments from its readers. Letters should be addressed to: Editor, Computerworld, 797 Washington St., Newton, Mass. 02160.

# Data Past

### Five Years Ago
### July 5, 1972

HARRISBURG, Pa. — The big cleanup began after tropical storm Agnes crippled DP centers in five states. DP managers in hard-hit areas made plans to install new systems and tried to retrieve lost files by any means available, including drying out millions of waterlogged punch cards and cleaning out mud-coated disk packs and tapes.

— — —

SACRAMENTO, Calif. — A bill which exempted from taxation all software except that sold with a computer was signed into law by Gov. Ronald Reagan. The exemption was for two years and was intended to give the state time to arrive at a sound basis for assessing all software.

### Eight Years Ago
### July 9, 1969

Increases of up to 25% in DP costs were expected by major users of IBM equipment as the primary result of IBM's unbundling, effective Jan. 1, 1970.

— — —

NEW YORK — Intercomm, a system monitor called the "missing link" of communications was developed by Programming Methods, Inc. for the IBM 360. The system was intended to provide a comprehensive package that blended the accessing of data, the operating system and the data base into a single environment.

## Business Employers Discriminating?

# Should a Degree Be a DP Employment Requirement?

**By Jack Stone**

Special to Computerworld

*Legislation passed during recent years protects Americans against discrimination in employment on the basis of race, creed, color, national origin, sex, age and physical appearance, among other qualities.*

*These laws have given rise to agonizing reappraisals of current policies, methods and tools for DP personnel recruitment, placement, promotion and discharge.*

*For example, aptitude testing for entry-level DPers is currently under fire because of concerns that such tests are inherently biased towards certain social classes and therefore, are not sufficiently accurate in predicting successful performance in the DP environment.*

*Another issue, the subject of this week's column, is the question of whether the specification of a college degree is a proper prerequisite for employment of a programmer or analyst who is exclusively engaged in the support of business systems.*

*The implication is, of course, that the college degree establishes a basic level of competence in the field, irrespective of the knowledge a myriad of DP career successes achieved without degrees.*

*As illustrated in this passage excerpted from a recent recruitment advertisement, the connection between the job need and a B.A. degree often appears tenuous:*

*"Junior analyst/programmer with experience in the development of interactive systems using Cobol and TSO on IBM System 370. Knowledge of commercial data base management systems in support of health or medical research programs preferred. Bachelor's degree and minimum two years experience required."*

*The issue is well presented in this eloquent letter from a regular reader of this column:*

Dear Jack:

I have read the recent items in *Computerworld* concerning discrimination against women and the relative merits of recent computer science graduates as opposed to experienced programmers.

I also read the letter in the March 7 issue of CW from Lynn Pond of Chicago, who is not having much success in finding a new job because she does not have a college degree, even though she has 20 years experience.

I have tied these two observations together to arrive at the thought that perhaps there is a bias against otherwise qualified persons in DP who do not have college degrees.

My situation is as follows: I have several years of experience as a business applications programmer and am presently using Cobol on an IBM 370/135 running under DOS/VS.

My programming knowledge came from several different sources. I attended the Control Data Institute shortly after I graduated from high school, and I received on-the-job training where I worked. In addition, I took evening courses in the computer science department of the local community college, where I have accumulated 35 credit hours.

One reason I have been taking college courses is that I am afraid one day I will be unable to find employment for which my programming experience has prepared me because I will not have a college degree. Several concerns have led me to this belief.

One is the talk of the "Certified Data Processor" requirement. As I understand it, if the state legislatures were to pass this requirement, one would need to hold a Certificate in Data Processing (CDP) in order to perform certain functions. In order to qualify for the CDP, one would need a four-year college degree.

Also, despite the fact that I am not looking for a new job, I periodically check recruitment ads just to stay abreast of things. There are frequent ads for business applications programmers using Cobol which state that a degree is required. Because the ads describe work that appears to be the same type as mine, I have difficulty rationalizing the need for a degree.

## The Human Connection

I have come up with some possible explanations of why organizations require degreed people for business appliations development, but I don't see their validity:

- Perhaps these organizations fear (or hope) the CDP requirement will go into effect and are preparing for that day by hiring only persons who will have the academic credentials to sit for the exam.
- Maybe the organization wants to be sure it is hiring people who have mastered basic writing and math skills commonly taught in college. But since these skills are taught at the freshman level, why not at least consider persons who have some college experience but no diploma?

And, as a matter of fact, why not consider those individuals who have learned these skills in high school or on their own?

- Perhaps these employers shy away from people who have some college credits but haven't graduated because they want someone who has shown perseverence during a four-year period. Wouldn't continued employment with the same firm or in the same field be just as acceptable?
- Maybe these employers are afraid to hire someone who has left college without a degree, feeling that this person "flunked out." Yet, many people who have left college for academic reasons have proved successful in their DP working careers. College classes which lead to nonsuccess often have no relationship to DP training.

And many people have left college without "flunking out" — it is widely accepted that college is just not right for everyone. Also, just because a person doesn't go to college does not mean that the person wouldn't do well if he attended college.

Although a college education may not always be required for an advertised position, most companies require a degree for advancement.

Therefore, I would suspect that in such circumstances only degreed people are considered in order to avoid hiring people with a limited opportunity for advancement.

Perhaps the question of the need for degreed people in DP management positions is one to be explored on another occasion).

As a closing note, my current employer has no employment requirements regarding college education, and I think we do very well.

Regina S. Litman
Rockville, Md.

*Readers wishing to express their views on the subject of college requirements for business DP may write to Stone, Suite 222, 2233 Wisconsin Ave. N.W., Washington, D.C. 20007.*

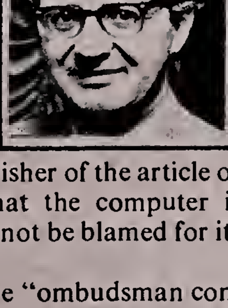
## Ombudsman Concept

# Individual Attention Can Improve Accuracy of Letters

Last month's *Communications of the ACM* had one of the more disturbing announcements in it regarding the Association for Computing Machinery's (ACM) use of personalized letters — in this case from its Ombudsman Program. It read:

"**ACM Ombudsman Program.** The chairman of the ACM Ombudsman Committee, Dahl Gerberick, is asking all ACM members to take note of articles that appear to blame the computer for some problem. Please clip and send such items to James Adams at ACM headquarters. A personalized letter from the ombudsman will then be sent to the publisher of the article or story, pointing out that the computer is only a tool and should not be blamed for its use."

**The Taylor Report**
**By**
**Alan Taylor, CDP**



The whole basis of the "ombudsman concept" is that individual consideration is given to each specific occurrence. Now, it appears the program is going to give individual consideration to each letter by personalizing it to the publisher. But that type of personalization does not give individual consideration to the computer-related problem behind the complaint.

### Knee-Jerk Reaction

When the program apparently intends to do is give an automatic reaction to the articles' failure to explain the well-known difference between a program and a computer. In actual fact, "computer" is now common shorthand for computer-programmed logic or output.

For instance, the General Motors ad on the back cover of the *Communications* talks about computers that "see" and about a computer system that "learns" and "inspects."

Apparently no one at the ACM objects to this phraseology or to the computer being given the credit perhaps due some software people. Why should we then continue to object to normal shorthand use of "computer"?

### Positive Side

Yet, personalized letters may not be such a bad idea after all — if the ombudsman understands he is not just a public relations man, automatically defending computers, but is a thinking, responsible person.

Personalized letters, no matter how bad in the first place, can act as a two-way communication method for improving the sender's understanding of the situation.

The Ombudsman Program, through creative use of such letters, could improve the ACM's understanding of what the world at large is actually thinking.

This use of personalized letters as a two-way operation is perhaps best known through the *Newsweek* life-time guarantee program, which has been running for about 30 months now. Its latest version arrived in the same batch of mail as the ombudsman's appeal.

One of the selling tools of the *Newsweek* campaign from its outset was the idea that everyone had been "selected." In early efforts, this was brought out in a paragraph that used the street address, but this sometimes led to results such as:

"You can be certain, **Mr. Clinic** . . . That this letter is not popping up in everyone's mail **on & Colby**."

This comes from the address: S.A. Clinic, 39th & Colby, Everett, Wa. The street address has since been omitted in the letter in favor of a more general: "The letter you have just finished was sent to a carefully selected audience."

### Another Focus

Another focus of the appeal was parental responsibility, using "household" or "family" with the presumed last name. The results went wrong in some cases such as this:

"You didn't know? With **Newsweek**, the **Dir DP household** would. Just read a little further for a few choice words from **Newsweek** about . . . "

The word "household" has since been changed to "children," which solves some problems, but not all; a clinic, for example, could have children.

After receiving *Newsweek*'s latest mailing, I had a few words with the fellow behind the program, Daniel Capell, a *Newsweek* vice-president.

Improvements in the mailings came about through reading recipients' complaints and then, after agreeing they were or were not justified, initiating steps to come up with another way of saying the same thing more accurately the next time around.

This apparently doesn't give Capell any great trouble. He just spends a few moments analyzing the complaint and deciding what to do about it. Most complaints reach his personal desk, so real consideration at a policy level is reached quickly.

### Working Solution

This correction system works.

When the *Newsweek* campaign started, and for over a year afterwards, many of you sent copies of its letters, but I haven't had more than a couple in the past six months, although there still are name problems. One unexpected problem is in not carrying the title "Mrs." through with a repeated married name. This failure creates unnecessary confusion with the husband in many cases, and sometimes with the children, if only initials are used.

Hopefully, if the ACM letter is phrased so as to invite communication from the people who wrote the articles about computer faults — and if the ombudsman takes the time to review both the articles and the responses properly — we can hope for a really useful understanding of the advancing knowledge of computers.

Both the bad and the good parts will become understood both inside and outside the ACM.

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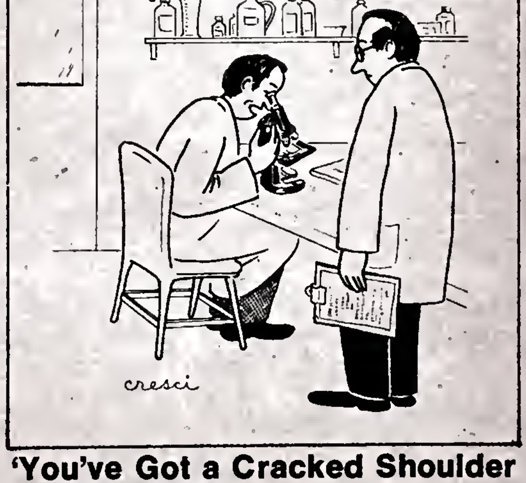

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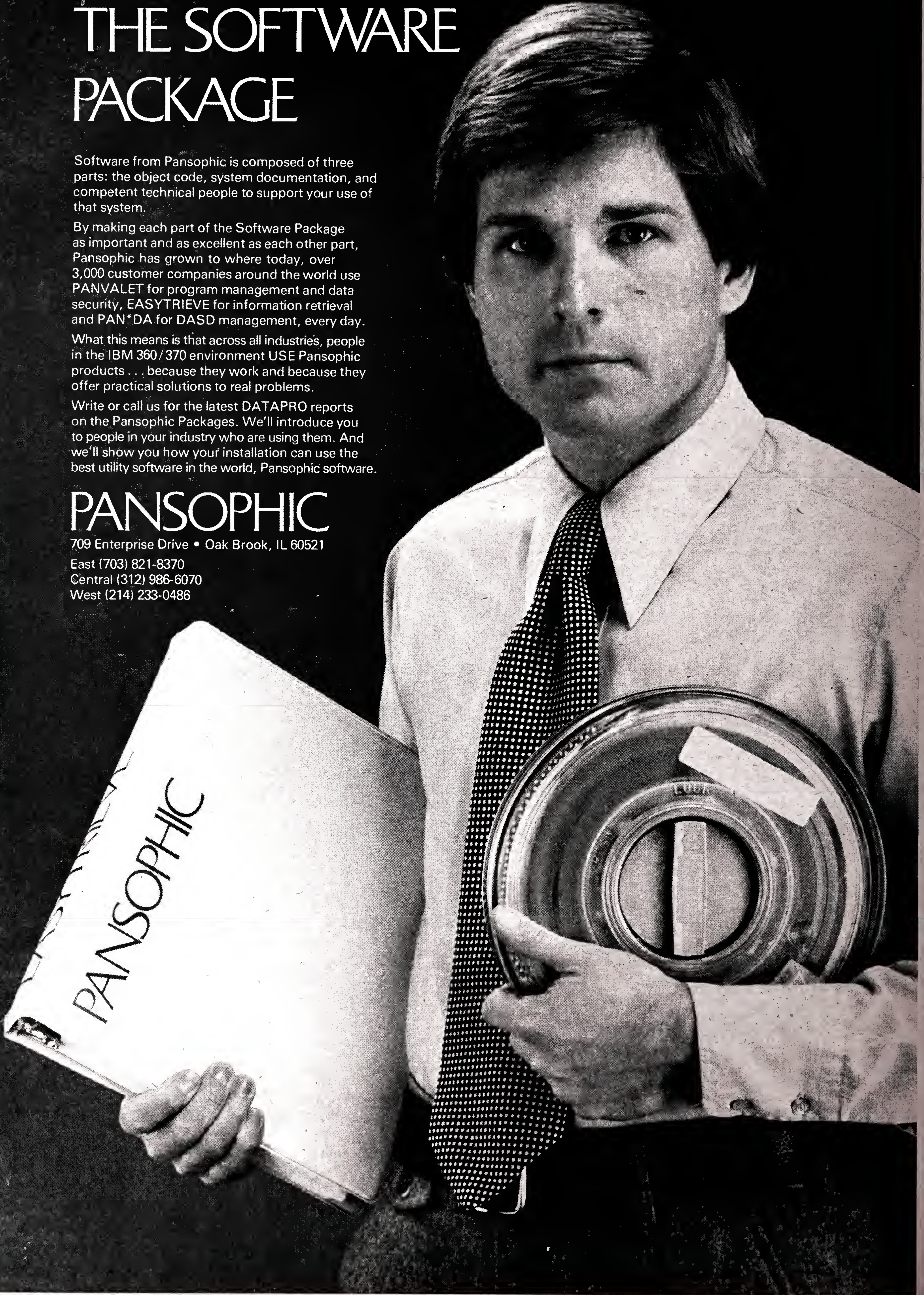

### Five Basic Steps Described

# Multilevel Approach Eases Data Base Design Chores

**By Don Leavitt**
Of the CW Staff

DALLAS — The design of large data bases involves a wide range of problems — from the application system specification to the choice of hardware. That is a difficult assignment, but a multilevel approach to the design of file organization seems to help, according to Arne Solvberg, professor at the University of Trondheim, now on leave and working at IBM in San Jose.

Such an approach has several advantages, Solvberg told attendees of a session on data base structure and organization at the National Computer Conference here recently.

It allows transparency of the design procedure, elimination of non-effective solutions at an early stage and postponement of the hardware/software selection until an appropriate design level has been reached, he claimed.

The multilevel approach consists of five basic steps. It starts with the specification of the information processing problem to be solved, then shifts into an effort to transform the specified information structures into a logical model of the file organization, Solvberg explained.

That is followed by modifying the logical model to fit a particular data base management system (DBMS) and physically implementing the modified model using the DBMS. The process winds up with an evaluation of the final solution using a performance analysis, he said.

The specifications for the problem are gathered in fairly routine ways, but then information is extracted from the analysis to "normalize" the procedure.

The user has to gain a description of the concrete or abstract objects that make up the system and the relationships between the objects. Then he must describe the permanent files (in terms of their purpose) and the retrieval processes to be implemented.

The linkages between file types — "messages" in Solvberg's terminology — are normalized and then the normalized message types are synthesized into a logical model. Finally, the model is modified in order to fit the retrieval requirements, he said.

So far no decision about any DBMS has been made, Solvberg noted. But the logical model is now modified to fit a particular DBMS in the "best possible" ways — by modifying the record layouts and altering the access paths.

**Restructuring Approach**

Earlier in the session, James P. Fry of the University of Michigan outlined an approach he had developed to cope with the need to restructure a data base once it no longer fit the installation's needs.

Fry said two approaches had been considered and that an "access path" approach to the creation of a restructuring language for network-oriented data bases was selected as the most likely to be effective.

The access path approach, in which all source structures are treated in the same way, is "more naturally suited to complex network transformations," he claimed.

Restructuring is an operation that accesses rather than manipulates data, therefore the operation is unaffected by the logical structure of the data bases, Fry explained.

Thus almost any data base is a valid candidate for restructuring, Fry noted, and there need be no similarity between the source and target data base.

# Ledger System Designed for Flexibility

NEWTON UPPER FALLS, Mass. — G/L Plus, the general ledger/financial analysis package from McCormack & Dodge Corp., is described as a highly flexible and comprehensive DP system.

At the same time, adherence to traditional accounting procedures and controls makes it "very user-oriented," a spokesman said.

The system handles multiple corporation processing of financial accounting and statistical data. Journal entries are entered manually or extracted from the output records of supporting subsystems such as payroll, accounts payable or accounts receivable.

The linkage between the user's existing subsystems and G/L Plus is transparent, the spokesman noted.

Coding provided by McCormack & Dodge "translates" the format of the output records into the format needed by the ledger system, performs front-end prorations and allocations, provides offset transactions and consolidates like transactions, he said.

**Limitless Reports**

Reports generalized in a single pass of the system are vitually limitless since they are parameter driven, the spokesman claimed. The user can specify the formats, the account groups and the reporting structure within the organization to be served by the reports.

Formats of virtually all normal accounting reports have already been coded, so the user has access to them as well as the freedom to shape others as special needs arise, he said.

Repeating journal entries are "warehoused" and each detail transaction contains its own start and stop date. Journal entries may be "diarized" to provide input worksheets for frequently recurring transactions, he added.

Accrual and reversal capabilities are standard. Retroactive journal entries updating prior periods of the same or the previous year are carried forward through all subsequent balances to accommodate post closing entries and restatement of selected reports, he said.

Erroneous journal entries are sent to an error recycle file or optionally balanced through a suspense transaction generation. Turnaround documents are generated to ease correction of errors detected, he explained.

The G/L Plus package consists of 18 ANS Cobol modules which can be implemented on any "moderate" sized IBM 360/30 or larger CPU.

The package now carries an introductory cost of $15,000 for installations willing to be Beta-test sites.

By the end of the year, the standard cost is expected to be in the $40,000 range, the vendor said from 381 Elliot St., Newton Upper Falls, Mass. 02164.

# Series/1 Cobol Ready Shortly

ARLINGTON, Va. — Series/1 Cobol is a compiler providing a subset of ANS 1974 specifications for the IBM Series/1 minicomputer. It creates reentrant code to be executed under a run-time monitor, according to the vendor, Advanced Software Products, Inc.

The level of Cobol provided by this system is equivalent to the federal standard for Low-Intermediate Cobol and is similar to other minicomputer Cobols, a spokesman added.

The Series/1 Cobol is said to take full advantage of the Series/1 instruction set and give performance equal to optimized assembler language code on a Digital Equipment Corp. PDP-11/34 or Cobol code on an IBM 370/135.

Up to 65,000 Procedure Division statements and 8M bytes of Working Storage are supported by using virtual storage management, the spokesman said.

Version 1.0 of the compiler running under IBM's Control Program Support is expected to be ready for delivery next month, he noted.

It will require a minimum 32K bytes of main memory for compilations and costs $1,800 for the first site and $120 each for additional sites.

Advanced Software Products can be reached through P.O. Box 992, Arlington, Va. 22216.

# Utility Set Supports IBM OS Operations

LYONS, Ill. — Users running under an IBM OS environment can consider a series of utility routines from General Electronics which the vendor claims will allow them to perform functions that are difficult or not now available using IBM's standard utility program.

The Kopy routine, for example, copies lists and provides a list of records copied. Records may be expanded or truncated and reblocked under user control. This $100 utility is described by General Electronics as "10 times as efficient" as IEBGENER.

Doclist is said to prepare printer output from 80-byte text records. This utility supports overprinting for underlining or highlighting and, at $200, is said to be "great" for preparing prototype reports.

"Reformat" reformats data files, permitting rearrangement, deletion, truncation, expansion or reblocking of records. Optional listing of input and ouput records is provided with this $250 package, a spokesman noted.

General Electronics can be reached through P.O. Box 79, Lyons, Ill. 60534.

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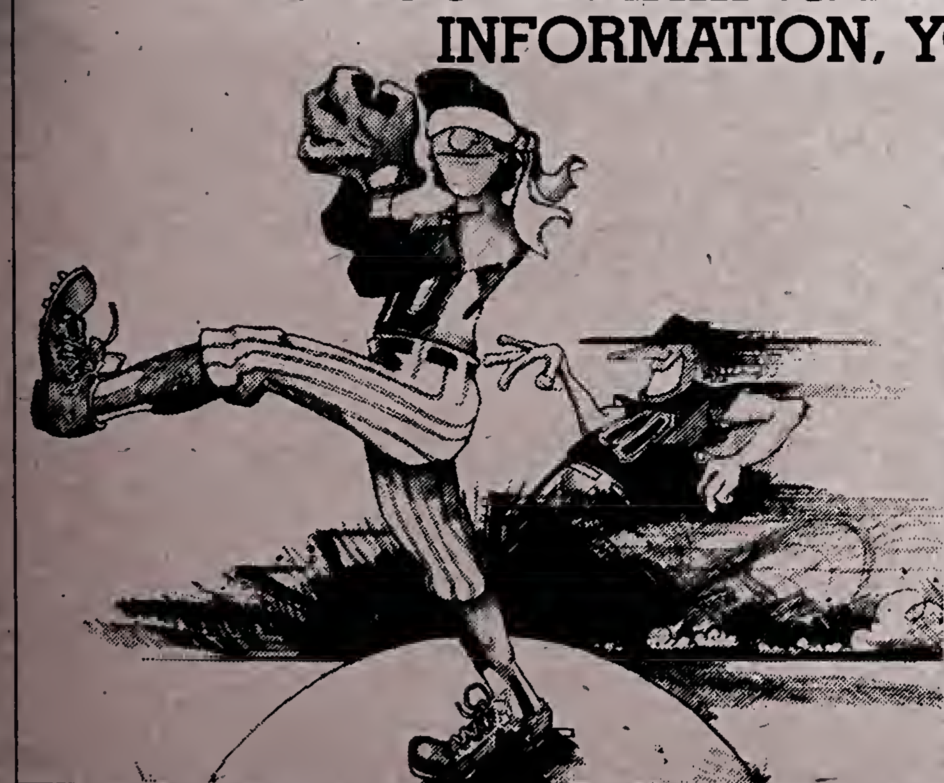

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# 'Gremex' Helps Teach Management Decision Making

ATHENS, Ga. — The Goddard Research and Engineering Management Exercise (Gremex) system from the Cosmic clearinghouse is a man-machine management simulation game that can be used to depict a project from just after the development of its plan through the final construction phase, according to a spokesman.

Gremex is basically a program evaluation and review technique (Pert) reporting scheme, he said. Unlike usual Pert routines, however, this program does not require the operator to input the amount of work performed in each activity before it can determine the expected completion date of the project.

The package assumes that all activities due to be worked in the current month will be worked. Gremex predicts new durations and costs based on management actions taken by the players and on the contractor's abilities, the spokesman added.

Each activity is assigned cost and duration estimates, but must also be assigned parameters indicating the probability that the estimates will be met and that the project will be a technical success.

Management actions usually can be expected to change these probabilities; reestimating future events and assigning probability factors provides life to the Gremex model, the spokesman noted.

Gremex is not a production job for project management; it poses no "best way" to manage a project but does expose participants to many of the factors involved in decision making when managing a project, especially in a government research and development environment.

A management team can win the game by surpassing cost, schedule and technical performance goals established when the simulation began. The serious management experimenter can use Gremex to explore the results of management methods he could not risk in real life, the spokesman claimed.

Written in Fortran IV for execution in batch mode, it has been implemented on an IBM 360 with approximately 350K bytes of memory available to the user.

Cataloged as program number GSC-11512/CW, the system costs $810. Documentation is available for a separate fee of $8, the Cosmic spokesman noted from 112 Barrow Hall, University of Georgia, Athens, Ga. 30602.

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# Manufacturers Gain Network Aid

ST. LOUIS — The Advanced Manufacturing, Accounting and Production Systems (Amaps) software from Comserv Corp. will be available to users in the U.S. and Europe through the facilities of the McDonnell Douglas Automation Corp. (McAuto), under terms of an agreement recently signed by the two companies.

The system is said to provide integrated control over the diverse operating departments and functions of a manufacturing company. Its use "solves many of the communications, production and material control problems inherent in a company of this nature," a Comserv spokesman stated.

Amaps consists of nine modules: bill of material, material control, material requirements planning, forecasting, purchasing control, standard cost, capacity requirements planning, process and routing, and shop floor control.

Users on the network will be free to utilize just those parts of the system that are pertinent to their needs, just as users with in-house IBM 360/370s have been able to install those elements they wish, Comserv said.

Comserv is at Metro Office Park, 3050 Metro Drive, Minneapolis, Minn. 55420.

McAuto has branch offices in a number of cities; network headquarters can be reached through P.O. Box 516, St. Louis, Mo. 63119.

# Versatec Software Plots Gray Tones

SANTA CLARA, Calif. — Full gray-scale halftones can be produced on any Versatec electrostatic plotter equipped with a specially developed Fortran package, according to a spokesman.

Unlike previous digital gray-scale techniques, the Versaplot Gray Scale software maintains both high contrast and sharp detail, the spokesman said.

Blacks are "100% black," whites are "100% white" and only gray areas are screened, he stated.

The Versaplot Gray Scale software provides "more than 32" levels of gray. "This is more refined scaling than the eye can differentiate," he claimed.

Gray scale is emulated through controlled variation in dot clusters (halftone cells) produced on the electrostatic plotter. With 200 dot/in. Versatec plotters, 40,000 dots are available for each square inch of image area, he said.

Going beyond emulation, the software can be used to modify digital images. Dot clusters, each simulating a halftone dot, can be reshaped in outline, spatial frequency and contour. The user may also select the number of gray levels to be permitted, the spokesman said.

The Versaplot Gray scale package consists of less than 1,000 Fortran statements and can be run on any minicomputer with 16K bytes of memory and a disk file, he added. It may be used by itself or in conjunction with Versatec's generalized Versaplot electrostatic plotting software.

The Gray Scale package is available for a one-time license fee of $1,000, the spokesman noted from 2805 Bowers Ave., Santa Clara, Calif. 95051.

# Data Base Dictionary Published by Atsu

BOULDER, Colo. — A directory of interactive data bases, "Data Bases Available to Users," has been compiled and published by the Association of Time-Sharing Users (Atsu).

With descriptions of 250 data bases from 25 remote-computing vendors, the 75-page report is indexed by subject. Among the topics covered are banking, business, economics, education, energy, engineering, finance, science and stocks and bonds, a spokesman said.

Atsu, a 1,200-member nonprofit association, also publishes a bimonthly newsletter called "Interactive Computing" and a two-volume set of directories that cover many aspects of remote computing.

The organization also includes a number of special interest groups and regional user groups which meet at various times during the year.

"Data Bases Available to Users" is part of the two-volume set of directories distributed free to Atsu members, but it is also available separately to nonmembers for $15.

New members are always welcome, the spokesman added from Atsu headquarters at 75 Manhattan Drive, Boulder, Colo. 80303.

# Canadian Firm Has APL Planning Course

TORONTO — Assistance in the planning and operation of APL on in-house equipment, regardless of the vendor, is now being offered by Numetrix Ltd. Neither time-sharing vendors nor computer manufacturers can provide the degree of impartiality this independent can, a spokesman claimed.

One of the lines of support Numetrix provides is a modularized APL education and training course consisting of texts, lab and teaching aids. The course is adaptable to meet the needs of the user, whether he is working with an IBM 5100, a Digital Equipment Corp. Decsystem-20 or a Hewlett-Packard 3000, the spokesman added.

Companies using APL for business applications usually start by subscribing to a time-sharing service, he said, but eventually a range of factors — costs, concern about sensitive data, inconsistencies between in-house and outside processing techniques — make consideration of in-house APL necessary.

Numetrix can help evaluate the alternatives and implement decisions on a case-by-case basis, the spokesman stated from Suite 602, 3 Church St., Toronto, Ont., Canada M5E 1C9.

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### Net Incorporates Snap Protocol

# TCTS Offering Datapac Service on a Commercial Basis

**By John P. Hebert**
Of the CW Staff

OTTAWA, Ont. — The Trans-Canada Telephone System (TCTS) has made available its Datapac packet-switched data communications network on a commercial basis.

TCTS' formal rate structure for the Datapac digital service was approved last month after being filed with the Canadian Radio-Television & Telecommunications Commission last November, a spokesman noted.

Charges for the service are primarily based on usage, but distance is also a consideration in Datapac's rate structures, he said.

Datapac uses computers to logically control the flow of information between most types of data terminals and remote host CPUs.

Datapac serving exchanges (DSE) have been established in 57 Canadian communities. Users in non-DSE areas can gain access to the network through an off-network access arrangement, the spokesman noted.

**Incorporates 'Snap'**

The packet-switched network incorporates the Standard Network Access Protocol (Snap), which is based on the CCITT X.25 protocol.

TCTS customers using Datapac on a trial basis since last January have become the commercial network's first users, according to the spokesman.

All data on the network is transmitted in the form of packets of up to 256 characters each along intercity Dataroute digital facilities, he said.

At present, TCTS has an agreement with Telenet Communications Corp. and Tymnet, Inc. to provide U.S. users access to the digital service.

By mid-1978, TCTS plans to make the three networks compatible by integrating the X.25 protocol at the switching nodes and upgrading the nodes from temporary to permanent operation, the spokesman stated.

Network usage is primarily determined on a kilopacket transmission volume basis.

Between Toronto and Montreal, for example, data users with intelligent terminals using the Snap protocol will be charged 40 cent/kilopacket, the spokesman stated.

From Toronto to Vancouver, users will be charged 93 cent/kilopacket, while users transmitting data between Toronto and Ottawa will be charged 32 cent/kilopacket, he said.

Terminals not using Snap will require the usage of a network interface machine, which converts the "native mode" data from the terminal into Snap. It costs an additional 25 cent/kilopacket, regardless of distance, the spokesman noted.

A packet priority service on Datapac guarantees immediate transmission of user data and costs an additional 25% more than the normal rates, he said.

A host access charge on Datapac will cost a user $417.50/mo for a 9,600 bit/sec circuit and $60/mo for a 300 bit/sec circuit.

### Cost, Control Factors Cited

# Firm Scraps Old System for Remote Batch Net

**By Esther Surden**
Of the CW Staff

PHILADELPHIA — Increased control with a corresponding reduction of costs are two reasons often cited by DP managers for changing from one method of doing business.

These were the same reasons that prompted the management of Acme Markets, Inc. to scrap its potpourri of decentralized older equipment in favor of a remote batch network, according to J.R. Paules, Acme's manager of DP operations here.

Speaking before a recent conference here, Paules explained that prior to developing the net, the firm had a variety of equipment ranging from an IBM 360/40 and three 360/25s to an old IBM 1400 scattered between headquarters and the local divisions.

This decentralized approach led to no standardization of applications software and little control over DP costs, he told the attendees.

The company decided to install a remote batch network because "we wanted to reduce the total costs at the remote locations and eliminate duplicating people at each location, he said. The old equipment, especially the 1400, had become difficult to support and maintain, he added.

The firm decided it wanted to centralize control at the corporate location and implementing such a system takes specified steps, according to Bill Besnier, Acme's group leader for systems programming.

First the user has to decide how the system is going to be used, define I/O volumes and establish when the system will be used. Realistic service levels also have to be set, Besnier said.

Since the remote sites were already doing the applications, there was no need for Acme to theorize volume, Besnier indicated. Daily output figures were readily available and "we also know how long the billing system ran," he said.

The hours during which the system was to be used was established easily since all printing had to be completed by 8 a.m. so reports could be useful. In addition, the firm was "told by management that no terminal can be down for more than four hours," he said.

This requirement was so stringent that if the terminal is down for any length of time the firm will charter a private plane and fly the reports in.

Management also told the department that it would not staff for remote batch operations, he said. Unfortunately, there were few people already on staff with batch experience and because of this is was decided that any terminal chosen had to support IBM 2780 protocol. "It's been around for a long time and is a known," he noted.

**Hardware Requirements**

The next step was to determine all the hardware requirements, Bensier continued. For example, certain speeds had to be achieved on a card reader, he said.

*(Continued on Page 26)*

### Correction

Omron Corp. terminals and Datamedia Corp.'s 1500 series terminals were rated highest in overall performance in the recent Datapro Research Corp. user survey contained in its report, "All About Alphanumeric display Terminals," [CW, June 13].

# Telex Adds Printers in Response to IBM Moves

RALEIGH, N.C. — Telex Terminal Communications has responded in kind to the recent additions to IBM's CRT terminal, cluster controller and printer product lines.

Telex has introduced two printer products which are said to offer the user better price and performance than the IBM 3287 and 3289 printers [CW, May 23].

The firm also introduced a remote, cluster terminal subsystem and Synchronous Data Link Control (SDLC) capability Binary Synchronous Communications (BSC) for the Telex TC 241 and 3270-compatible product line; and price reductions for those 3270-compatible products [CW, June 20].

The Telex TC 287 is a 180 char./sec matrix printer that is said to be a 50% improvement in speed compared with its IBM 3287 printer counterpart. The TC 287 can replace the IBM 3284, 3286 and the 3287 models 1 the 2, according to Telex.

It can be attached to the Telex TC 271 or TC 272 cluster controllers or to IBM's 3271, 3272 or "properly configured" 3274 controllers, a spokesman stated.

**Line Printer Capabilities**

Telex' TC 289 is a line printer capable of operation at speeds up to 340 line/min — a top speed that is 13% faster than its IBM 3289 Model 2 counterpart, the spokesman said.

TC 289s are available with a 64-char. set and can be optionally equipped with a 96-char. set.

The TC 289 can operate on the TC 271 2nd 272 cluster controllers, as well as with IBM's 3271 and 3272 or "suitably configured" IBM 3274 controller, he noted.

The TC 287 printer has 7 by 9 dot matrix characters. It costs $6,250 to buy plus $40/mo for maintenance and will be available in the third quarter.

Telex'TC 289 line printer is priced at $8,750, maintenance costs another $70/mo. The terminal also will be available in the third quarter.

Lease plans from one to five years are available, the spokesman noted, from 3301 Terminal Drive, Raleigh, N.C. 27604.

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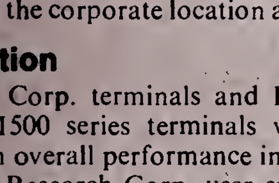

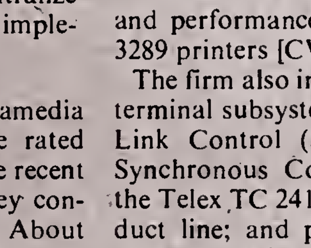

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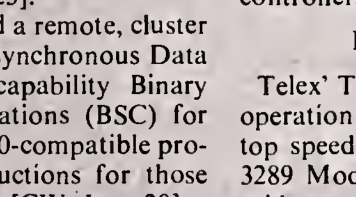

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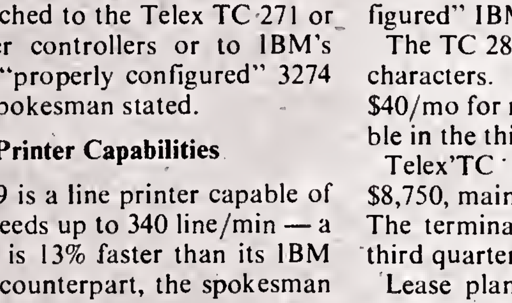

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# Terminal Transactions

## Ramtek Adds Graphics Terminal Controlled by Microprocessors

SUNNYVALE, Calif. — Ramtek Corp. has introduced an eight-color graphics communications terminal with microprocessor control of the display and user program areas.

The 6000 Series Micrographic Terminal is said to offer true graphics and high-speed alphanumerics overlay without expensive software development. It is also available in a basic black and white version.

Terminal functions are controlled by a Z80 microprocessor with up to 28K bytes of programmable read-only memory and 16K bytes of random-access memory, the company stated.

A graphics resolution of 512 elements by 256 lines on up to three color planes is complemented by display of alphanumerics in 7 by 10 dot matrices in an 80-char./line by 25-line format, according to a spokeswoman.

The terminal's 128-Ascii-char. keyboard includes 40 function keys and cursor control for both the alpha and graphics screen presentations, the spokeswoman noted.

Transmission speeds from 110- to 9,600 bit/sec, full- or half-duplex operation, parity and on- or off-line operating modes are operator selectable, she said, adding the terminal can operate synchronously or asynchronously.

It also includes an RS-232C or current loop interface.

Options to the 6000 Series Micrographic include a floppy disk interface, additional serial I/O ports, user-defined formats and terminal control software packages.

A basic Micrographic costs $5,400; the black-and-white version is available for $4,700.

The company is planning to offer more applications software packages in 1978, the spokeswoman noted from 585 N. Mary Ave., Sunnyvale, Calif. 94086.

## Trivex Has IBM 3775 Replacement

COSTA MESA, Calif. — Trivex, Inc. has announced the Model 0752 standalone data entry terminal, a plug-compatible replacement for the IBM 3775.

The terminal supports IBM 3784, 3786 and 3788 printers according to a spokesman. It offers features such as light pen, optical character recognition wand, in addition to user and customer engineer diagnostics.

The diagnostics are able to test the 0752 in the local mode and supply the user with network failure information when on line, he said.

The terminal costs $98/mo on a three-year lease and costs $3,950 to purchase, the spokesman noted from 3180 Red Hill Ave., Costa Mesa, Calif. 92626.

## MCS Micro-Based Midas CRTs Support Communications, Editing

ELMSFORD, N.Y. — Mini-Computer Systems, Inc. (MCS) has expanded its CRT product line with the introduction of the Midas II and Midas III terminals, microprocessor-based devices which are said to support communications and text editing functions.

The Midas II has eight selectable transmission rates from 110- to 19,200 bit/sec, can operate in half- or full-duplex modes and supports on-line communications, according to an MCS spokesman.

It can display 24 lines of 7 by 9 dot matrix characters at an 80-character density per line. A 128-character display repertoire is also available, the spokesman noted.

Both terminals include an RS-232 or current loop interface.

The Midas III CRT has the same features as the Model II and also provides full keyboard edit, field attribute edit and a 2K paging option, the company stated.

The terminals are complemented by MCS' line of modular Deskware that reportedly permits users the opportunity to configure their systems.

The Deskware includes a contour-design workstation with a semicircular layout that was designed to increase operator efficiency, according to the firm.

The Midas II terminal costs $1,995 and the Midas III costs $2,245; the Deskware for either is another $230.

On 12-month rental plans, the Models II and III cost $85/mo and $95/mo, respectively, and the modular workstations are an additional $14/mo. MCS is at 525 Executive Blvd., Elmsford, N.Y. 10523.

## Matrix Terminal for OEMs Expands Diablo Line

HAYWARD, Calif. — Diablo Systems, Inc. has added the microprocessor-controlled Model 1660 matrix terminal for OEMs to its communications terminal product line.

The terminal features 110-, 300-, 1,200- or 1,800 bit/sec transmission speed capabilities in Ascii code and a ballistic matrix print head with a wide head-to-paper gap.

The 1660's microprocessor helps provide incremental and bidirectional printing, horizontal and vertical tabbing, multiple selectable fonts, control code functions and forms handling capabilities, the firm added.

It prints 7 by 9 dot-matrix characters as well as upper- and lower-case characters and reportedly will print an original plus five or more copies using a 94-Ascii-char. sets, the firm noted.

The 1660 is said to be compatible with Bell 103A, 113A, 202 and 212 modems and other 110- to 1,800 bit/sec asynchronous modems using the RS-232C interface.

An internal print buffer is utilized, eliminating the need for "pad" or time-fill characters, Diablo claimed.

Three switch-selectable interface protocols are built into the microprocessor program which can be used to prevent data loss regardless of paper movement commands or other codes that might interrupt continuous printing operation, it added.

Basic Diablo 1660s cost $2,850 each in minimum quantities of 50 units. The company is located at 24500 Industrial Blvd., Hayward, Calif. 94545.

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IN **SYSTEMS**-HOUSES

## Firm Scraps Older Equipment

*(Continued from Page 25)*

Choosing the communications lines itself was difficult. "We looked at various configurations" and discovered, "once you get high speed, the cost also gets high," he said. Full duplex, 7,200 bit/sec lines were selected.

The control unit that was chosen came from an independent vendor. Acme was not very satisfied with the IBM system available to it because it had no diagnostic ability. Software was a key choice, he added. The code used had to be not only standard but reliable too. Acme decided to stay with IBM's Rtam, he noted.

Because of the directive to minimize outage, the firm had to have redundancy, but couldn't spend any money to achieve it, Bensier said. All the systems involved then had to be easily serviceable or have built-in redundancy, he noted.

### Deciding on a Terminal

Choosing the remote batch terminal was also a challenge, he said. After looking in *Datapro* and narrowing down the choices, Acme looked at IBM, Data 100 Corp., Remcon and Harris Corp.

IBM was "eliminated quickly" on the basis of cost, the fact that the 2780 and 3780 could not support the speed the company had determined was necessary, the 2922 was relatively new and Acme did not want to buy a new product, Bensier explained.

Both Data 100 and Remcon were left. Both were 2780-compatible, so the real decision was based on cost. Acme did look at the mean time between failure listed by the vendors, but "I found it very misleading," Bensier said. The user has to evaluate how that number is determined.

The Remcon system, which is now part of CMC a division of Pertec Computer Corp., provided a data compression feature which the firm found attractive.

The front-end processor was the next item to be selected. The DP department eliminated consideration of all programmable front-end processors because it didn't know enough about the communications software, Bensier said.

The choice was limited to a Memorex Corp. 1270 or the IBM 2701 which it found was limited in the number of terminals that could be handled as well as in diagnostic capabilities.

## ISC Unveils Monitor, Color Graphics CRT

NORCROSS, Ga. — Intelligent Systems Corp. (ISC) has introduced an intelligent, eight-color terminal with graphics capabilities, in addition to an eight-color video monitor.

The Intecolor 8013 terminal has an Intel Corp. 8080 microprocessor, random-access memory refresh capabilities, a separate keyboard plus special graphics hardware and software. ISC offers a choice of 64 special characters with the 8013.

The terminal also comes wth a CRT that can display 48 lines of characters at a density of 80 char./line, in addition to an RS-232C interface, the company added.

A front-mounted access door provides entry to a color convergence board for color setup and registration. Space is also provided for inserting an optional floppy tape and mini disk drive combination for additional storage, ISC said.

The Intecolor 813 monitor has been developed for OEMs and is said to provide systems manufacturers with an effective way to upgrade their systems' terminals to color.

The 8013 costs $3,495. The 813 is sold in quantities of 10 or more and costs $500 each in the minimum quantity, ISC said from 5965 Peachtree Corners E., Norcross, Ga. 30071.

# Memorex Unveils Tape Subsystem For IBM 370s

DALLAS – Memorex Corp. introduced a magnetic tape subsystem here recently that includes 1,600- and 6,250 bit/in. tape drives and controllers for use with IBM 370/135 through 370/168 systems.

Memorex's 3220 subsystem – which is functionally equivalent to the IBM 3803 Model 2 and 3240 models 6 and 8 – consists of the models 3226 and 3228 tape drives and models 3221 and 3222 controllers, according to a spokesman.

The subsystem may be configured in several ways, depending on the number of controllers, the maximum number of tape drives and the particular installation requirements, he added.

Both the Memorex 3226 and 3228 tape drives provide dual density capability as a standard feature, allowing either 1,600 bit/in. or 6,250 bit/in. reading/writing to take place without operator intervention, he claimed.

When in read/write mode, the 3226 drive moves tape at a speed of 125 in./sec, yielding a data transfer rate of 200,000 bit/sec at 1,600 bit/in. and 781,250 bit/sec at 6,250 bit/in.

The 3228 tape drive, in read/write mode, will move a tape at 200 in./sec, yielding a data transfer rate of 320,000 bit/sec at 1,600 bit/in. and 1.25M bit/sec at 6,250 bit/in.

Memorex provides two tape controller models, the 3221 and 3222, to permit configuration flexibility, the spokesman said. Each controller contains a microprocessor to translate data, calculate and check the error correction code and direct status information to the system channel, he explained.

The microprocessor checks its own circuits and the tape drives during the machine idle loop. It runs diagnostics on the attached tape drives, he added.

Memorex's 3220 series consists of from one to four 3221 and 3222 controllers and from one to 16 3226 and 3228 tape drives per subsystem, in any combination.

With four controllers, four simultaneous data transfers can occur between any four of the tape drives in the string, the spokesman said.

A typical configuration consisting of one 3221 controller with optional channel switch, two 3226 tape drives and four 3228 tape drives costs $4,560/mo on a 24-month extended-term lease.

The same configuration can be purchased for $221,700 from the firm at San Tomas at Central Expressway, Santa Clara, Calif. 95052.

# On-Line System Yields Bonus Benefits for Stores

DES PLAINES, Ill. – Ben Franklin Stores here reports "extraordinary benefits" since going on-line with a system to process vendor invoices for payment.

Cash position improved as did supplier relations. Employee turnover dropped sharply while morale rose and jobs were enriched. Buying and merchandising operations gained in efficiency and management confidence in overall computer support systems increased.

And in addition to all this, annual costs savings are running into tens of thousands of dollars, according to Donald Soderquist, president.

Installed last year, the on-line system unsnarled a mounting logjam in the matching of incoming invoices against open orders – a chore that is especially vital at Ben Franklin, Soderquist said.

However, he added, the impact of the "Controlled Order Invoice Network" (Coin) now extends well beyond the confines of the accounting department, reaching into many aspects of a dynamic business.

### Liability Becomes Asset

"With the Coin, we turned a departmental liability into a business asset," Soderquist noted.

"In addition to solving a serious problem, we accomplished more with this system than we had ever anticipated. We now have the capability to cope effectively with a rapid growth pace that we expect will speed up more in the immediate future," he added.

Growth waa a principal factor in creating the invoice matching problem that had plagued the operation for some time. Ben Franklin, a division of City Products Corp., is embarking on a store franchising expansion program.

The expansion push is expected to add a minimum of a million square feet of retail store space annually, Soderquist said.

Along with the store expansion has been a steady growth and diversification in merchandise lines. With more stores to service and more merchandise to buy, the invoice matching workload reached gigantic proportions involving as many as 2,500 invoices a day, Soderquist pointed out.

The sheer size of the problem was compounded early in 1974 when Ben Franklin centralized all invoice and accounts payable processing for the eight distribution centers at division headquarters here.

### 'Severe Bind'

"With the centralization and the growing workloads, we got into a severe bind," James Battista, accounting systems manager, recalled. "Although our computer systems were sophisticated, our method of data input was archaic."

As a result, the activity of matching vendor invoices to Ben Franklin purchase orders – a necessary function to put them in line for payment – began to fall far behind the desired pace. The bottleneck steadily tightened to the point where it was taking as long as 18 days to clear invoices for closeout, Battista explained.

*Changing a simple accounting routine like invoice matching would not seem likely to produce widespread advantages. Yet, at Ben Franklin Stores, going on-line with invoice matching has changed a department liability into a business asset.*

The delays in invoice matching were unacceptable to management because of the importance the division places on taking full advantage of vendor discount opportunities. But there were other aspects of the problem.

The logjam proved self-perpetuating as the tempo of vendor inquiries requiring invoice receipt and payment status stepped up, creating more paper shuffling and information searches.

Labor costs in the department skyrocketed as more people were hired to handle the heavy workloads, and employee morale plummeted because of the menial types of processing activities involved with the manual invoice matching procedures, Battista stated.

"This situation grew so bad that there were some months in which we experienced a 100% worker turnover," he said.

In late 1974 the decision was made to "go on-line" with the invoice matching procedure, eliminating the hard-copy retrieval of open orders and the manual comparing of invoice and order details, according to Ron Walters, manager of DP.

This was accomplished by linking IBM 3270 visual display terminals to the IBM 370/145 CPU. The on-line hookup permits terminal display of any record on a processor-maintained open order master file, he noted.

The file record is created at the time the Ben Franklin purchase order is issued and is complete in all details, Walters said. Terminal operators can access the open order file by purchase order number, by merchandise item number, by vendor number or by promotion code.

Ten of the terminals located in the department are dedicated to invoice matching. Using the terminal and the Coin program, the operator can complete the matching and close out an invoice for payment in a matter of minutes.

Programming for Coin is such that the terminal operator is guided through every step of the invoice closeout procedure by means of instructions appearing at the bottom of the screen display.

"We designed the new system for ease of use and for positive control," Walters explained. "The computer itself makes all needed calculations for price extensions, discount and tax amounts.

"In the event of a terminal shutdown for any reason, the system will keep track of all prior transactions and then pick up where it left off when the terminal comes back on-line.

"Also, the Coin system interfaces with our purchasing system on the one end and with our accounts payable system on the other," he noted.

Ben Franklin is now saving thousands of dollars a month by taking full advantage of vendor discounts, Walters reported. Supplier relations, which had been deteriorating because of slow payments and difficulties in obtaining invoice status information, now are improved, he noted.

Labor cost savings in the invoice matching function are substantial, he said. The staff has been reduced from 31 to 10 employees despite the fact that invoice volume is higher by some 10%.

# Dataproducts Adds Four Printers With Varying Print Technologies

DALLAS – Dataproducts Corp. introduced four printers here recently, each utilizing a different print technology.

The B-180 and B-300 line printers, which utilize a hammer and band technology; the M-200 impact matrix printer, which uses a dual column 14-wire head; and the T-80 thermal matrix printer made up the Dataproducts offerings.

The B-180 and B-300 line printers uses a steel-band font carrier and microprogrammed control to produce 180- and 300 line/min throughput respectively, according to a spokesman.

Both printers use the same font carrier bands, each holding 208 characters with a reported life of more than two years use in a typical application, the spokesman said.

A band-edge guide system provides adjustment-free vertical print registration and reportedly eases band changes, he claimed.

The printer electronics are centered around a microprogrammed controller that utilizes bit slice architecture. A built-in test feature enables tests to be run independently of host devices and a diagnostic display indicates the cycle the printer is in should failure occur, the spokesman explained.

Both printers use a stepper motor paper feed system to provide a slew rate of 15 in./sec. They both handle up to 6-part industry standard forms from 3- to 15 in. wide and up to 14 in. long, the spokesman said.

They will print at either 6- or 8 line/in. and will print to the bottom of the last form, he added.

Dataproducts will begin deliveries of both units in early 1978. The B-180 will be priced under $3,000 and the B-300 will be under $3,300 in OEM quantities, the spokesman said.

The M-200 uses a dual column 7 by 7 half-dot matrix font and a logic-seeking lookahead feature to product 320 char./sec in a bidirectional print mode, according to the spokesman. Users can expect throughputs ranging from 125 line/min with a 132-char. line to 300 line/min with shorter, 40-char. lines, he added.

### 132 Print Positions

The M-200 produces the standard Ascii 96-char. set plus an additional 32 commonly used international characters. It offers 132 print positions and can handle up to 6-part forms, he continued.

The 14-wire dual-column print head offers optional character spacing for condensed or expanded printing. The firmware controlled option permits user selection of 16.7-, 10-, 8.3- or 5 char./in.

The M-200 has a mean time between service calls of at least six months at a rated workload of 8.5 million char./mo, he claimed.

The unit will be available for deliveries in the second quarter of 1978. It costs under $2,000 in OEM quantities, he said.

### Thermal Matrix Printer

Dataproducts T-80 is an 80 char./sec 80-column thermal printer that utilizes a 5 by 7 dot matrix for printing and a 7 by 7 dot matrix for plotting.

The unit has an 80 msec/line slew speed and incorporates a single-head print mechanism.

The T-80 will be available for delivery in May 1978 and costs $940 in OEM quantities, the spokesman said from 6219 DeSoto Ave., Woodland Hills, Calif. 91365.

## Protecting the DP Center – Part 4

# Contingency Planning Minimizes Emergencies' Impact

**By Irving M. Cruper**
Special to Computerworld

*This is the conclusion of a four-part series on physical security of the computer center by Irving M. Crupar of the Wackenhut Corp. The series is extracted from a chapter in the* Automatic Data Processing Handbook, *copyright 1977 by McGraw-Hill, Inc.*

*In his conclusion, Crupar takes a look at contingency planning for continued computer center operations following an emergency situation. In past weeks, Crupar has discussed security needs, fire protection and electronic detection devices.*

An emergency situation should not seriously impede the continued operation of required electronic DP.

The planning for continuation or resumption of operation should include:

- A program to protect records in accordance with their importance.
- An analysis of the workload and the effect upon continuity of operations, organized for each computer facility.
- Arrangements for emergency use of other installed computer equipment to cover plans for transportation of personnel, data, and supplies to an emergency computer location, in addition to agreements and procedures for the emergency use of the computer equipment.
- Programs designed with an adequate number of checkpoints and restarts to ensure rapid recovery to normal operations.

### Personnel Instructions

All personnel should receive continuing instructions and review in:

- The method required for turning off all electrical power to the computer under both normal and emergency conditions.
- Turning off the air conditioning in the area.
- Alerting the fire department or company fire brigade.
- Evacuation of personnel.
- The location and proper operation and application of all available fire-extinguishing and damage control equipment, including automatic detection and extinguishing equipment. Computer-room personnel should be fully trained in carbon dioxide usage through actual operation of the equipment on a practice fire.
- The importance of records and their storage requirements.

A written emergency fire plan should be prepared for and posted at each installation, assigning specific responsibilities to designated personnel. The following major items should serve as a guide, and are suggested as minimum features of this plan:

- Remove all power to the computer system. Provide a means, such as a main-line circuit breaker or equivalent. Provide a remote control for this purpose near the operator and next to each of the exit doors.
- Shut down the air conditioning system. This should be done if the main circuit breaker does not control the air conditioning system. Emergency means similar to those for the computer system should be provided.
- Notify proper authority. Building fire brigades should be notified immediately and outside fire-fighting companies should be called immediately to assist.

If the electronic equipment or any type of records are wetted down, smoky or otherwise affected by the results of a fire or other emergency, immediate action should be taken to clean and dry the electronic equipment.

If the water, smoke or other contaminations are permitted to remain in the equipment longer than absolutely necessary, the damage may be grossly increased.

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# Microelectronics Seen Directing Hard Copy's Future

**By Frank Vaughan**
Of the CW Staff

DALLAS — The future of hard-copy output devices depends on the utilization and enhancements of microelectronics, new materials and new manufacturing processes, as well as user's needs, according to Irving L. Wieselman of Dataproducts Corp., Woodland Hills, Calif., a manufacturer of such devices.

Speaking at a recent National Computer Conference session entitled "Output-Results and Rhetoric," Wieselman discussed hard-copy computer output and its future.

The principal hard-copy output of computer systems is alphanumeric data produced on computer output printers that range in speed from 10 char./sec to 18,000 line/min. The prices range from less than $1,000 to $300,000, Wieselman said.

Printers are classified by three characteristics: impact or nonimpact, character or line printer, shaped or dot-matrix characters, he explained.

In addition to hard-copy printers, there are three types of plotters in general use: the drum, flatbed and electrostatic, Wieselman said.

Certain types of computer output printers can be used for plotting if the printed symbol spacing can match the plotting requirements. Plotters are utilized for hard copy whenever graphical data is the prime output of the computer, he noted.

The particular choice of a hard-copy output device for a given system depends on the application, the print quality and/or graphic output requirements, the output volume, the speed of data availability and output speed capabilities, he said.

Additional criteria are the flexibility and availability of output character sets and symbols, system costs, expendable costs and the maintainability and reliability, he pointed out.

### Various Technologies

In his discussion of hard-copy output devices, Wieselman discussed the various technologies that are generally being used.

The changes in price/performance for existing products in the past few years have primarily resulted from improvements in large-scale integration (LSI), new materials technology and production automation, he stated.

Products using new technolgies, such as ink-jet printers and laser beam electrophotographic printers are based on the refinement of new inventions and concerted investment in new development, he said.

The expanded use of LSI and the emergence of microprocessors have not only made dramatic improvements in existing products, but have also affected the way in which we conduct our day-to-day affairs, he added.

### Use of Microelectronics

The use of microelectronics in hard-copy output equipment has not only reduced the cost of electronic control. It has provided more flexibility and increased use of electronics to perform functions which were previously handled by mechanical or electromechanical equipment, Weiselman said.

The reliance on a paper-tape reader for vertical format control was replaced by Dataproducts when lower-cost shift registers became available, he said. The firm plans to replace these with microprogrammed logic to provide additional flexibility, he claimed.

Dot matrix formed characters, which have the appearance of being produced from shaped character impact fonts, are possible because of the lower cost of storage. The IBM 6640 uses a dot structure of 24 by 40 (960 dots) now, as compared with other dot structures as low as 5 by 7 (35 dots), to produce characters, he said.

### Cheaper Production

Possibilities for lower-cost production techniques using more plastics and less metal are emerging in products in the marketplace, Weiselman indicated.

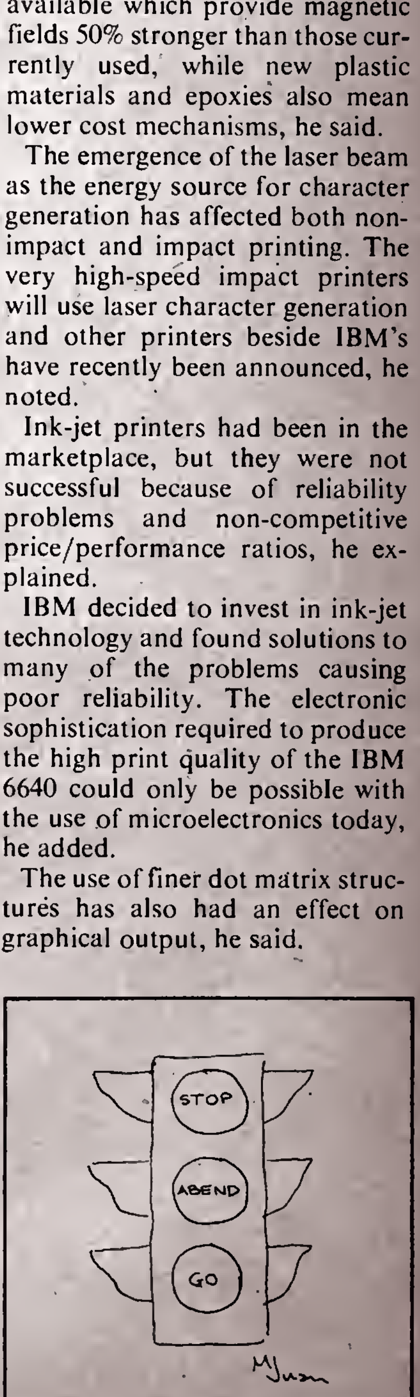
New magnetic materials are available which provide magnetic fields 50% stronger than those currently used, while new plastic materials and epoxies also mean lower cost mechanisms, he said.

The emergence of the laser beam as the energy source for character generation has affected both nonimpact and impact printing. The very high-speed impact printers will use laser character generation and other printers beside IBM's have recently been announced, he noted.

Ink-jet printers had been in the marketplace, but they were not successful because of reliability problems and non-competitive price/performance ratios, he explained.

IBM decided to invest in ink-jet technology and found solutions to many of the problems causing poor reliability. The electronic sophistication required to produce the high print quality of the IBM 6640 could only be possible with the use of microelectronics today, he added.

The use of finer dot matrix structures has also had an effect on graphical output, he said.



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Senior journalist with excellent business/trade contacts and writing skills. Should have experience writing and placing articles about technical products and markets. Ideal candidate will have 5-10 years experience, preferably in the computer and/or electronics industry.

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Will be the prime liaison between Data General and Ingalls, for all business and trade advertising in support of the company's marketing activities. Should have excellent understanding of creative process, developed by 7–9 years advertising contact experience in agency and/or a corporation. Also needs solid understanding of electronics/computer industry.

SALES PROMOTION ACCOUNT SPECIALIST

Senior writer to set direction and produce creative, market-specific copy for company's sales promotion collateral — brochures, trade shows, direct mail, spec sheets, audio visual, application notes. Should have 5–7 years copy and contact experience in the electronics/computer industry, with solid understanding of art and production coordination functions.

If you want the challenge, send your resume, complete with salary requirements, to Mr. Kevin Steele, Data General Corporation, 15 Turnpike Road, Westboro, MA 01581.

Data General

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## Mini Bits

### BTI Business System Gets Increased Disk Capacity

DALLAS — Basic Timesharing, Inc. (BTI) has enhanced its minicomputer business time-sharing system with the introduction of a 10M-byte non-removable disk drive, a heavy duty 3M Co.-type cartridge tape drive and a line of printer options.

The 10M-byte disk replaces a 7.5M-byte Diablo-type drive previously available for the system. The increased capacity was given at no charge to the user, a spokesman said.

In addition, the firm is shipping a 3M-type cartridge tape drive that runs at 6,400 bit/in. as a backup medium.

A 300 line/min, 132-col, 96-char. medium-duty line printer and controller costs $8.950.

A heavy-duty 300 line/min, 136-column 64-char. unit that includes a vertical forms unit, static eliminator, active ribbon deskew, paper motion sensor and paper holder costs $8,950.

A 600 line/min version costs $18,500, while a 900 line/min unit can be purchased for $23,700.

Basic Timesharing is at 870 W. Maude Ave., Sunnyvale, Calif. 94086.

### AIIE to Host Conference On Mini Applications

NEW YORK — A conference on "Minicomputers — the Applications Explosion" will be held here July 18 to 20.

Sponsored by the American Institute of Industrial Engineers (AIIE), the conference is addressed to executives and professionals concerned with current and potential applications of minicomputers either from the DP or the user point of view, a spokesman said.

The conference costs $265 for AIIE members and $295 for nonmembers.

Information is available from AIIE Seminars, P.O. Box 3727, Santa Monica, Calif. 90403.

### Short Course to Examine Personal, Micro Systems

JAMAICA, N.Y. — St. John's University here is offering an intensive short course on personal computers and microcomputer-based business systems.

The course will review the state of the art in current microcomputer technology including both hardware and software design as well as numerous applications of personal computing in education, recreation and business.

It will meet every Tuesday from 6 p.m. to 8 p.m., Sept. 27 to Oct. 18, and will cost $29. For further information contact Dean Patrick Basilice, Evening Division, St. John's University, Jamaica, N.Y. 11439.

### While Constroversy Rages

# Minis Help Nuclear Waste Researchers

**By Esther Surden**
Of the CW Staff

IDAHO FALLS, Idaho — While controversy rages over the environmental impact of nuclear energy, scientists at Allied Chemical Co. here, armed with desktop minicomputers, are trying to find an effective, economical alternative to present methods of handling nuclear wastes.

With environmentalists concerned about the dangerous waste products left after the uranium is processed and energy conservationists worried about the inefficient use of fuel, studies here could have a wide-ranging impact.

"The object of our research is to verify the various processes that put it [nuclear waste] in the form of solid waste rather than liquid waste and to demonstrate that these processes can be done safely with a minimum impact on the ecological system," acording to Dr. Harry Lawroski, assistant general manager of the Idaho Chemical Program at Allied.

Another object is to "recover the uranium, which is very valuable," he added. With some modification, the techniques developed at the lab can be applied to other nuclear installations. "We are proving these techniques — proving that they can work and they have worked," he stated.

All the fuel used in the experiments at Allied "comes from the Energy Research and Development Administration — from research reactors at universities, for example," he said.

### Laboratory Uses

The desktop minicomputers are used in laboratory operations ranging from chemical analysis to budget monitoring. Some of the systems are interfaced to monitoring and data acquisition instruments such as mass spectrometers, flame spectrometers and pulse height analyzers.

"Ten percent of our 550 employees do their own programming," according to Harry Deveraux, group leader for instrumentation applications.

"The presence of portable computing systems allows chemists to get on-line quickly and solve problems without the waiting experience associated with single large systems. Nontechnical people can also run programs and acquire meaningful data," he added.

Allied uses 12 Hewlett-Packard Co. systems including one HP 9810, eight 9830s and three 9825s. The systems were purchased as a result of a bid situation, according to Lawroski.

Typically, the systems are used to control instruments. In one application, for example, a system is interfaced to a carbon rod-type atomic absorption spectrometer, Lawroski said. Small carbon rods are charged with the elements under study.

Through the interface, the system controls heating the rods at rates up to 300 degrees C per second. While the sample is atomized, the system acquires and evaluates the resulting data.

Another system is used for effluent studies — tests which look at various types of radioactive fission products, seeking ways to contain them.

A recent test determined the durability of crystalline zeolite, an encapsulant medium for radioactive krypton, for example. The system evaluated the leak rate of the crystals at various temperatures and pressures.

Nuclear plant simulation is also an important part of Allied's research, according to Dr. John Baldwin, supervisor of Allied's Analytical Research Section.

Plant design and utility routing must consider system safeguarding as well as structural factors, Baldwin said. Such a seemingly simple operation as routing a pipe becomes complicated when the transported material is radioactive. The smallest leak can have serious consequences.

"The interfacing computations were designed to accomplish two things: to reduce the possibility of human error and to save the chemist from the tedious process of manually collecting and analyzing data," Baldwin explained.

**Desktop system monitors mass spectrometer at Allied Chemical Co.**

# ICL Offers 220 Series CPU As Singer System Ten Upgrade

**By Esther Surden**
Of the CW Staff

EAST BRUNSWICK, N.J. — ICL, Inc. clarified its commitment to the Singer Business Machines System Ten user base last week with the introduction of the 220 series, described as an upgrade path for those users.

The ICL-developed processor features the same design principles as the earlier System Ten series processors but with a faster processor cycle time than its predecessors in the 110 series. Core capacity and disk handling facilities have also been enhanced on the 20, according to a spokeswoman.

The system "protects the investment" of current System Ten users because they can run their software and peripheral devices on the 220 without modification, the spokeswoman said. In addition, "many existing processors can be upgraded" to become the Model 220 system, she added.

The ICL 220 CPU is already available to European and South African users. It is designed for the same type of user who used the System Ten — those primarily concerned with business applications such as order processing, invoicing, accounting.

The core memory capacity of the system has been increased from a maximum of 110K 6-bit char. to 160K char.

The System Ten processor consists of fixed hardware partitions with each partition's core size determined and set in the field.

Up to 20 partitions can be handled by the system, but the maximum memory size of each partition on the older processor was 10K char. With the enhancements, each partition can accommodate up to 80K char. of memory.

Memory locations in common to all users have been increased from a maximum of 65K char. to a maximum of 80K char., the company added.

To upgrade peripheral capacity, the company introduced two disk drives. The Model 43 is a fixed/removable device with an 8M-char. capacity, while the Model 44-3 is a 20M-char. drive.

Total on-line disk capacity for the system has increased 60% to 160M char.

Software enhancements include improvements to the Disk Management System, DMF2, which are said to take advantage of processor improvements to increase data management efficiency. The company will also provide enhancements to the assembler, sort functions and RPG-II software on the system.

A typical ICL system with 20K char. of memory, a 1920-char. CRT, an 8M-char. disk drive with 4M fixed and 4M removable and a 165 char./sec serial printer costs $39,000.

A model with a dual disk pack with 8M char. of removable disk pack costs $36,500, a spokeswoman said from the firm at Turnpike Plaza, 197 Highway 18, East Brunswick, N.J. 08816.

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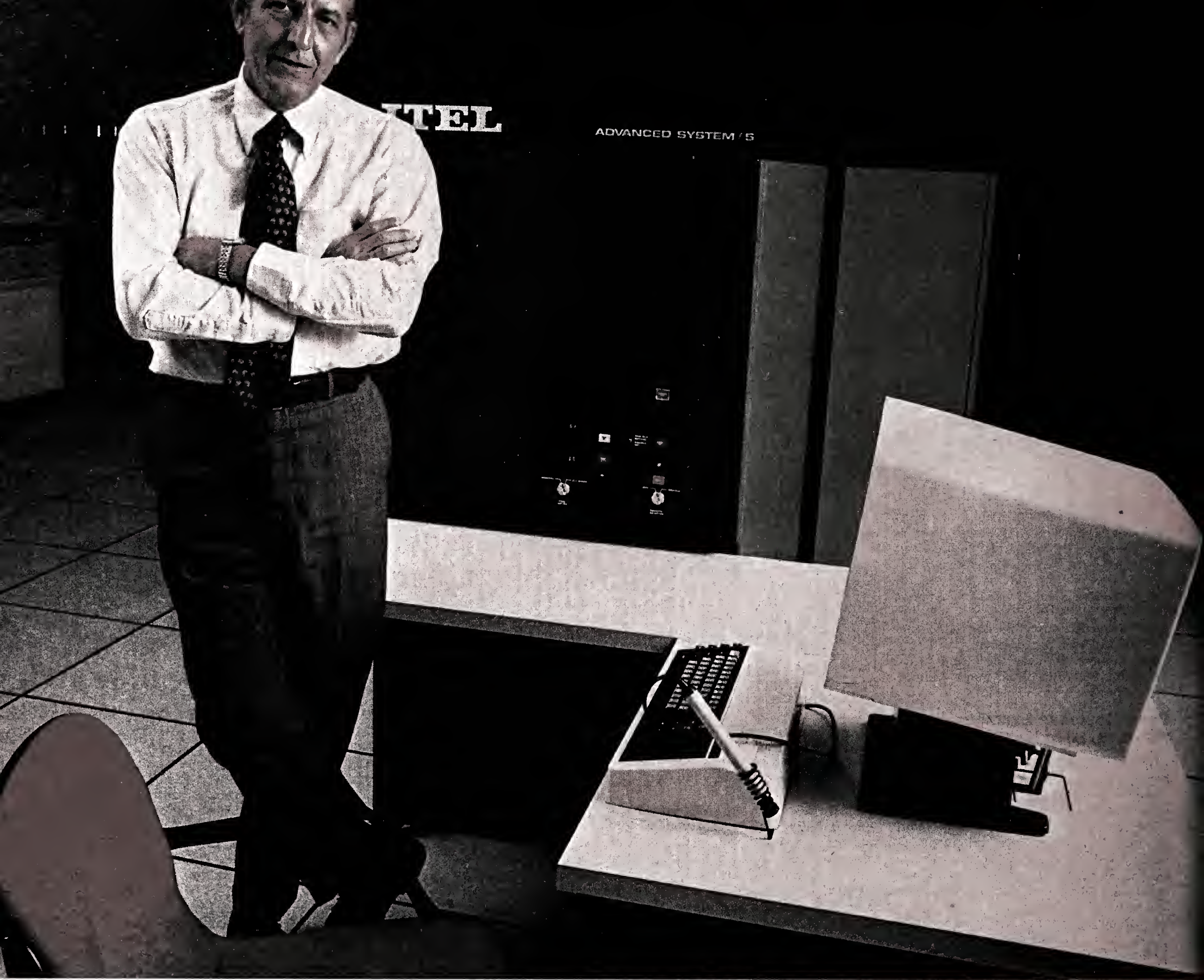
# "Very impressive... Itel's Advanced System™ was installed and fully functional within three hours and fifteen minutes!"

Kenneth Garrison, Vice President,
Information Systems Executive,
Pacific Mutual Life Insurance
Company, Newport Beach, California



"Itel's record installation time was outstanding, especially when ours was the very first Advanced System to be installed. And its performance has proven to be as impressive as its installation.

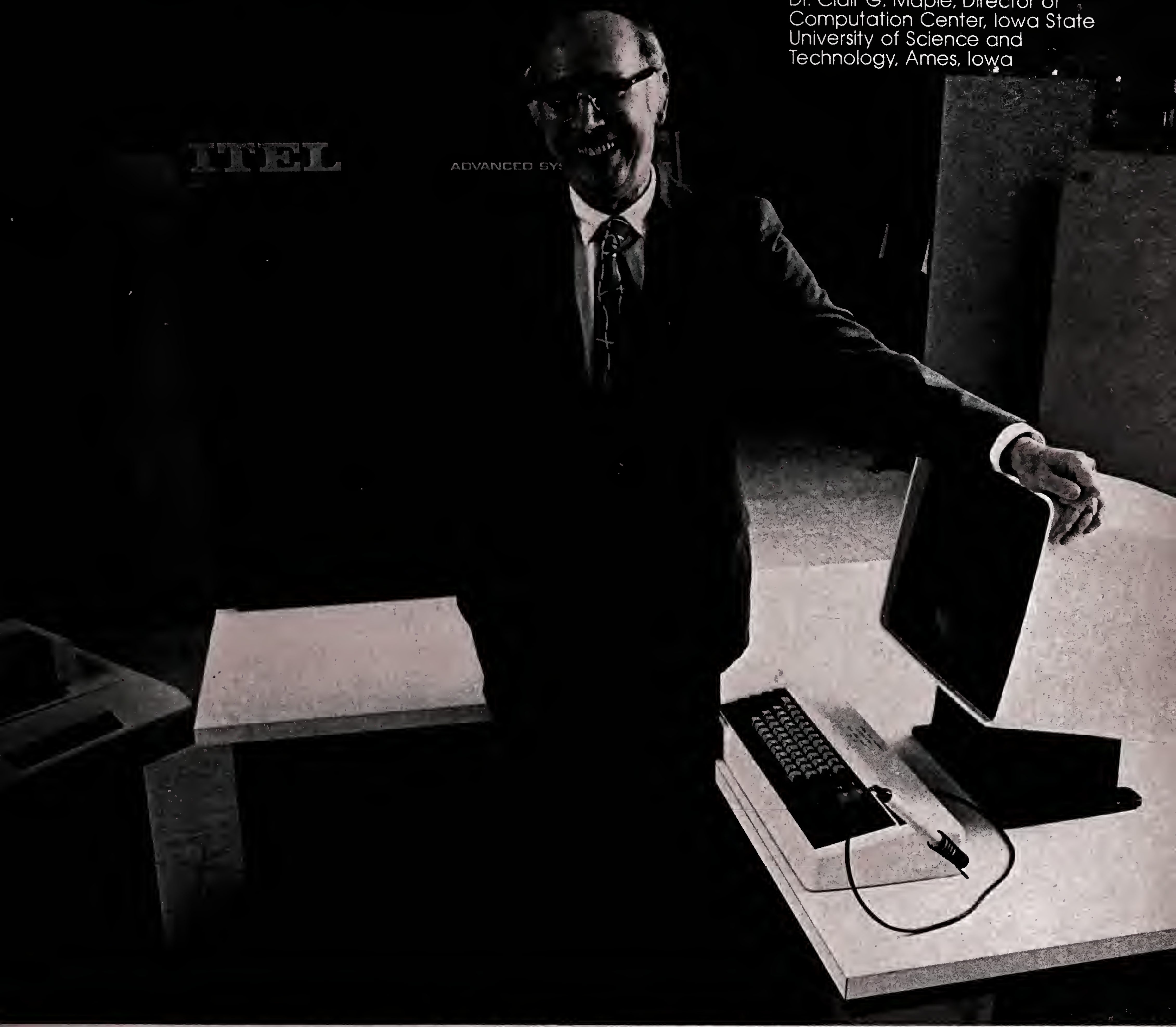
"With more than $1.7 billion in assests to manage, you can imagine the variety of complex tasks to which we put our EDP equipment. Of course, we knew we could expect performance from the system. Before replacing our IBM 370/155 with Itel's AS-5, we conducted extensive pre-installation tests to determine compatibility, reliability and error correction capabilities of the Advanced System. And all tasks were completed in equal or faster time compared to IBM's 370/158.

"Also contributing to our decision was the fact that the Advanced System would protect our investment in programming, documentation and personnel training. So, not only did we save on initial cost, but we're saving money in the long run, too.

"Choosing the AS-5 was a good move–we've been thoroughly pleased with the Advanced System and with Itel every step of the way. We sincerely feel that Itel deserves every accolade possible for the quality and reliability of their Advanced System, and the quality and professionalism of their people."

"Incredibly enough, we made no software changes at all when we put the Itel Advanced System™ into production."

Dr. Clair G. Maple, Director of
Computation Center, Iowa State
University of Science and
Technology, Ames, Iowa



"We're thoroughly pleased with the AS-5. Installation was completed with remarkable speed, and its performance has been outstanding. We're quite proud that Iowa State is the site of Itel's second Advanced System installation.

"We were initially receptive to the AS-5 because there seemed to be economic advantages involved. We saw the opportunity to replace the IBM 370/158 and to increase memory size, add secondary storage, upgrade our magnetic tape system and modify the CPU to a model III, all within a price range we could afford. And to be able to do all that without software modifications and without utilizing more space is positively remarkable.

"Here at the university, our Advanced System has between fifteen and twenty thousand users. It handles a wide range of activities – from course-related student programs to university-generated academic research. And its performance has been very impressive.

"In fact, we've been very favorably impressed in all areas of contact with Itel – from the outstanding performance of their products to the professional standards of their personnel and the excellence of the service they've given us."

**ITEL**
**CORPORATION**
**Data Products Group**
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# Harris Broadens 1600 Series Offerings

DALLAS — Three miniprocessors, two key-to-disk software packages and auxiliary memory have been added to the Harris Corp. 1600 family.

The three processors - the 1650, 1660 and 1680 — are filed-upgradeable from the existing 1610 and 1620 processors.

The 1600 family can integrate batch and interactive hardware and software into a single, centralized, controllable system, Harris claimed.

The 1650 processor, primarily intended for key-to-disk data entry applications, can operate up to eight key entry terminals concurrently with remote job entry communications to central host computers. Its memory is expandable to 96K bytes, according to the firm.

The 1660 can perform a variable mix of remote job entry, batch Cobol, key entry and interactive applications.

The 1680 is a dual-processor configuration that enables a user to combine any two 1600 family models into a single unit.

The auxiliary memory is available in 16- and 32K-byte increments and is said to enable 1650 and 1660 processors to be used in 64K-, 80K- and 96K-byte configurations.

The key-to-disk software packages introduced — Format/10 and Format/41 — enable a 1600 system to process intermixed format- and program-driven applications, the spokesman added.

### Typical System Prices

A typical Harris 1650 system including four key stations, 64K of memory, a 6M-byte disk, a 300 line/min printer and 9,600 bit/sec communications leases for about $1,770/mo including maintenance and sells for $60,720.

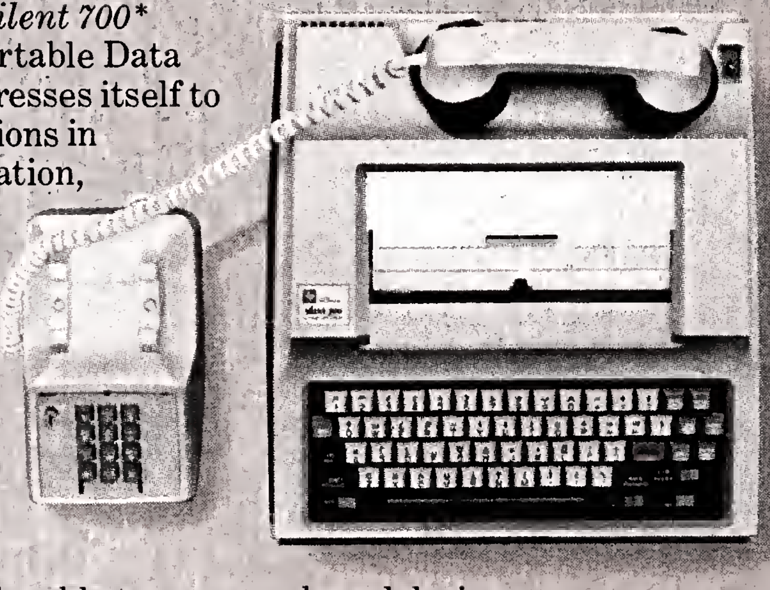
A 1660 with eight CRTs, 96K of memory, a 12M-byte disk, a 1,200 line/-min printer and transmission handling capabilities up to 19.2 Kbit/sec costs about $3,572/mo, including maintenance, and can be purchased for $128,888.

Pricing for a 1680 depends on the processors combined and the configuration, Harris noted.

The Format/10 software, the processors and auxiliary memory is available now. The Format/41 key-to-disk software is scheduled for release in July and the 1680 dual processor is slated to be available in August, Harris said from 11262 Indian Trail, Dallas, Texas 75234.

Introducing a new set of characters.

TI's Model 745 is now available with APL.



Now, the *Silent 700** Model 745 Portable Data Terminal addresses itself to your applications in science, education, business and finance. And other programs requiring APL.

And since we're in character with your needs, you'll be able to understand the other benefits that have made the 745 the most popular portable data terminal on the market.

TI's 745 offers you fast remote access to your central computer. With lightweight 13-lb. briefcase mobility.

The terminal itself interfaces by way of a built-in acoustic coupler or an auxiliary EIA port. With virtually silent printing at 30-character-per-second data transmission rates. And a rugged TI microprocessor-based design.

The 745 with APL features half or full duplex operating modes. Standard parity options. And ASCII/APL keyboard. With readable font, true underscore and real back-space key.

To find out more about TI's 745 with APL, or our desk-top Model 743 KSR with APL, simply fill out the coupon and mail today. Or call your nearest TI sales office.

The 745 translates into a better solution for your APL needs.

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TEXAS INSTRUMENTS.

# Vendors' Units Micro-Based

DALLAS — Several vendors brought user-oriented microprocessor-based systems to the recent National Computer Conference here.

The Mupro-80D introduced by Mupro, Inc. is a microcomputer-based system with a floppy disk drive.

Designed as a general-purpose system or for software development, the system supports multiple terminals for simultaneous program development by more than one user, Mupro said.

The system runs the Mute software package, described as a disk operating system that supports the firm's Bsal-80 software consisting of a relocating block-structured assembler, linking loader and text editor.

A 32K-byte Mupro-80D costs $7,900 from the firm at 424 Oakmead Parkway, Sunnyvale, Calif. 94086.

### Personal System

Micromega Corp. unveiled its Micro M16, described as a fully assembled and tested 16-bit personal system.

The system can accommodate up to 60K 16-bit words of memory contained on boards that can be populated with 32K bytes. The CPU is a National Semiconductor Corp. Pace microcomputer that features six vectored priority interrupt levels and a buffered 16-bit address/data bus.

Software includes Pace Basic, an 8K macro assembler that generates relocatable and linkable code, a conversational editor, a linking relocating general loader, a debug program and a "mini-monitor" which writes onto cassette, loads from cassettes, scans memories and executes from start address, the company said.

Micro M16 costs $3,750 from the firm at Suite 12, 1131 Stemmons Freeway, Dallas, Texas, 75229.

Ebnek, Inc.'s Ebnek 77 is based on the TMS 9900 from Texas Instruments. A basic system includes 16K bytes of random-access memory and a 4K-byte operating system stored in erasable programmable read-only memory.

A cassette tape transport and video graphics terminal are also included in the basic system, the firm said.

An Ebnek 77 can be interfaced to standard peripherals. Memory can be expanded to 128K bytes in the system's cabinet.

The system costs $3,800 assembled, the firm said from 254 N. Washington, Wichita, Kan. 67202.

# COMPUTER INDUSTRY

## CI Notes

### Commerce Nixes CDC Sale Of Cyber 76 to Soviets

WASHINGTON, D.C. — The Commerce Department has blocked the sale of a Control Data Corp. Cyber 76 to the Soviet Union on grounds it could be put to military use.

CDC termed the denial "political."

The export license was denied "because [the Cyber] is far more powerful than any computer known to be available to the Soviet Union [and therefore] the likelihood of diversion to military or strategic uses is of serious concern," according to Commerce.

Safeguards to detect and prevent such diversion "were found completely ineffective by a government task force," the department added.

The computer was ordered in 1975 for weather research.

"We believe the Administration decision is essentially political rather than being based on sound technical grounds," a CDC spokesman said. "The decision is not surprising in view of the recent, almost daily, leaks of selected negative data from the evaluation personnel's classified report.

"Although it is couched in terms to indicate a thorough study was done, the decision was based on very narrow grounds that we believe will not stand up to close examination," he said.

CDC may appeal the decision, he added.

### Memorex Makes STC an Offer

SANTA CLARA, Calif. — Memorex Corp. has made a formal offer to acquire Storage Technology Corp. (STC).

Memorex offered to exchange .725 share of its common stock for each STC common share. Based on Memorex's closing price on the Pacific Stock Exchange, the offer is valued at about $75.5 million.

STC is considering the offer, but indicated an agreement in principle has not been reached yet.

### AMI, German Firm Ink Pact

SANTA CLARA, Calif. — American Microsystems, Inc. (AMI) and Robert Bosch GmbH have signed a five-year joint development agreement under which AMI will design metal oxide semiconductor parts for Bosch's products.

In addition, Bosch will acquire 747,000 shares of unissued authorized-buy AMI stock for about $14.2 million, thereby acquiring 25% of the U.S. firm.

### Wema Cancels Show

PALO ALTO, Calif. — The Western Electronic Manufacturing Association (Wema) has cancelled plans for Microfair '77, a combined educational seminar/product exhibit originally scheduled for this October.

Wema Chairman Kenneth Oshman said he was advised by executives of Fairchild Camera & Instrument Corp., Intel Corp., Motorola, National Semiconductor and Advanced Micro Devices that their firms are not interested in the show.

Chief executives of these five semiconductor companies recently announced formation of a new Semiconductor Industry Association, but said at that time they would continue membership in Wema as well.

## Supershort

### ISI Establishes Service Group

Information Science, Inc. has established a National Banking Group to supply computer-based human resources systems and consulting services to banks and financial firms.

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### *Investors 'Overreacted' to IBM*

# DP Stocks Seen Rebounding by Year-End

**By Molly Upton**
Of the CW Staff

NEW YORK — Although the DP industry's stocks are performing below those of the Standard & Poor and Dow Jones Industrial averages, this should change in the latter part of the year and into 1978, according to a report from L.F. Rothschild & Co., a brokerage firm here.

The investment community appears to have "overreacted" to IBM's mainframe and memory pricing adjustments and announcements, the report said.

IBM's action differed little from past moves, the report indicated, "but the way it has been done has confused the outside observer.

"One could speculate that, had IBM advertised its new equipment as another generation and introduced it somewhat earlier, the stock market would be greeting the announcements with as much enthusiasm as computer users," the report continued.

### Recovery Delayed

Rothschild postponed from 1977 to 1978 the time during which the DP industry would equal or outperform the Standard & Poor averages for three reasons.

These included downward revisions in 1977 earnings projections, especially for IBM and Burroughs; the skittishness of investors caused by the recent IBM announcements; and investor disenchantment with low-yielding multinational companies in general.

As reasons for its belief that the industry's stock peformance will rebound, Rothschild cited the strong order rates of both minicomputer and mainframe firms and increased demand, especially for memory, as a result of lower prices, increased applications and the move to distributed processing.

Furthermore, "we believe that IBM's efforts to 'relocate' whatever profits may have been lost [from mainframes and memories] to other areas within the total systems bundle will prove manageable for IBM's major competitors," Rothschild remarked.

The total systems competitor that offers hardware, software and services "will have sufficient flexibility to take advantage of the higher price umbrella IBM is creating in such areas as field engineering services and software changes," the report observed.

In addition, customer defections from a manufacturer are expected to be "relatively modest on a net basis" as in the past, the report stated.

### Time to React

IBM's competitors should have some time in which to formulate reactions because at least 70% of the non-IBM installed rental base is covered under three- to five-year leases, according to the report.

"True, IBM's price adjustments on existing installations will result in some near-term revenue and profit dislocations for the other mainframers as they follow IBM's lead and selectively reduce prices. However, the more important consideration for the longer term is preservation of the customer base," the report said.

The actions by IBM are not solely indicative of a price war, although they were made partially in response to competition from memory and plug-compatible CPU makers, the brokerage house indicated.

The moves principally reflect "historical price performance improvements and 'catch up' on the product cycle timing curve. Thus we believe IBM had been a bit tardy in making its 'normal' adjustment in the 1974- to mid-1976 period," Rothschild stated.

Much of the incremental demand for DP power will stem from the trend toward decentralization, Rothschild indicated. The interaction of remote units with a central mainframe should also fuel demand for larger central memories, as will the increased use of systems by non-DP persons, the report said.

Focusing on IBM's entry into the minicomputer marketplace, Rothschild said it should be possible for other well-managed mini makers to grow at about 25% over the next several years, even if IBM's market share rises substantially.

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# SBS Clears Regulatory Hurdles, Now Faces Legal Ones: Edelson

**By Toni Wiseman**
Of the CW Staff

NEW YORK — Satellite Business Systems [SBS] has hurdled a series of regulatory obstacles in its quest to achieve operating status as a domestic common carrier," but two legal hurdles remain ahead on the obstacle course, according to Harry Edelson.

Edelson, senior analyst at Drexel Burnham Lambert, Inc., noted SBS still faces a possible U.S. Court of Appeals review of the Federal Communications Commission's (FCC) approval — a review petitioned for by several interested parties including the Justice Department — and a Justice Department antitrust investigation.

"Those two legal actions are closely related, and it is increasingly apparent the Justice Department is the last major roadblock for SBS," Edelson stated.

### Justice vs. SBS

Edelson said it is ironic the Justice Department initiated an antitrust investigation of SBS on the heels of a similar action against AT&T in 1976 — two bodies which are basically competitors.

He further suggested Justice is less worried about the entry of IBM into the domestic satellite arena than it is about the joint-venture aspects of SBS. Edelson cited a filing in which Justice said:

"The entry of IBM into the domestic communications field could inject an aggressive, well-financed new entrant into a market too long dominated by a monopoly supplier . . . Even if a new entry in satellite communications were to be procompetitive, the [FCC] must determine whether this gain is outweighed by the loss of significant potential competition a . . . joint venture [between Communications Satellite Corp. (Comsat) and IBM] may entail."

The filing went on to say that IBM would probably enter the market in any case, resulting in competitive benefits and lacking the anticompetitive effects "implicit in the proposed joint venture," and Comsat would remain a potential entrant.

Since the Justice Department failed in its bid to have the FCC establish a complete factual record, it will establish the record itself, Edelson stated. To this point, he noted, civil investigative demands (CID) have been served on SBS, IBM, Comsat and Aetna to determine whether the SBS joint venture violates Section 1 of the Sherman Act or Section 7 of the Clayton Act [CW, June 6].

The CIDs, Edelson observed, are related to matters such as correspondence between AT&T and IBM on satellites, the choice of partners and organizational structure of SBS and CML Satellite and studies showing the expected effect of domestic satellite services on IBM.

### Catch-22 Situation

Looking at the IBM/Comsat joint venture, Edelson recalled the FCC gave IBM three options:

- Add a third partner, with no one partner controlling more than 49%.
- Enter the domestic satellite business with a 100%-owned subsidiary.
- Buy circuits from Comsat or others.

"In what was probably a Catch-22 situation, as far as Justice Department intervention was concerned, IBM chose the joint-effort option over sole-ownership option. It is likely IBM reasoned the joint-effort option would create less industry opposition and, therefore, have a greater chance of gaining regulatory approval," Edelson stated.

"If the Justice Department eventually files an antitrust suit against SBS because it believes Comsat and IBM should be free to enter the domestic satellite business inde-

(Continued on Page 34)

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### Adapso's Dreyer Says

# International DP Body Needed

**By Toni Wiseman**
Of the CW Staff

DALLAS — A call for a lobbying effort on the part of European users and for the formation of an international policymaking body composed of data processing organizations was issued here recently.

The problem of telecommunications networks and of the privacy and security of the information passing through them and across national boundaries affect everyone, Jerry Dreyer, executive vice-president of the Association of Data Processing Service Organizations (Adapso), told attendees of the On-Line International Conference.

"While we continue to improve technologies enabling data to be sent around the world, we enact laws which restrict the kind of data we can send, often destroying the very services we set out to perform," he said, referring to some privacy laws which would make computerized airline reservations an illegal infringement of privacy because names and flights would be linked in the data base.

"Obviously, we have not yet found the appropriate trade-offs — the balance between what society demands in the way of service and what it demands in the way of privacy," Dreyer said.

Success calls for sophisticated data communications networks, he observed, and these networks must operate under uniform world communications standards.

"Just as we in the U.S. are at long last accepting the metric system as the standard measurement, similarly we all must move toward an international standard in the important field of communications and, I argue, it must be a high standard, one that data processing organizations can use," he stated.

### Cooperation Urged

Dreyer pointed out that if U.S. and European DP organizations do not act in a unified manner on these matters, "we will find that the initiative has been seized by other groups and that the results will be difficult

(Continued on Page 34)

# 'Applications Houses' Booming as OEM Clients for CDC

**By Molly Upton**
Of the CW Staff

DALLAS — The "applications houses" market for OEM products has been growing at a tremendous rate for Control Data Corp.'s Peripheral Products Co., according to Dale Showers, vice-president of OEM marketing.

Although known principally for its disk products, CDC's OEM line also includes terminals, printers, an optical character recognition reader and media; it will soon include tape drives, he indicated in an interview here recently.

CDC's OEM business started picking up after the recession when it changed its marketing thrust from large companies to include smaller customers, he said.

In 1975, about 10% of its customers accounted for about 90% of its business. But CDC saw the minicomputer boom coming and substantial mainframers exiting business and put a major emphasis on sales in the mini area, he said.

CDC classsifies its OEM customers into four types: large; mini manufacturers; applications houses; and the large account that might consider an end user.

Rather than refer to CDC's fastest growing class of OEM customers as systems houses, Showers calls them applications houses because what they really are selling is specialty in specific applications, he explained.

### Services Offered

In addition to its range of products, CDC offers other services to these firms, many of which are young. Its service affiliate, Syntonic, offers service for other firms' products on a contractual basis in 12 cities and plans to expand to at least 18 locations, Showers said.

In addition, CDC is starting to offer financing to firms through its Commercial Credit Co. (CCC) operation. Showers observes it is often difficult for firms to obtain financing from banks for inventory, and CCC could fill that need.

In selling to large end-user customers on an OEM basis, the company has strict criteria firms must meet in order to qualify for OEM purchases, Showers said. They must be in the business to resell products; be repetitive in volume; and add value to the product.

In order to increase the distinction between the OEM group and the rest of the company, there are very few products marketed by both. One exception is the 400M-byte disk drive, he admitted.

The disk business comprises the major part of CDC's OEM volume, he indicated.

### More Than Disks

"One of the problems is that people don't know we're in other OEM areas," Showers continued. "We're more of a force in terminals than people realize."

CDC's share of the OEM printer market took a dip, but Showers expects it to increase again with the addition last year of a band printer, which he said is superior to other 300 line/min printers.

In terminals as well as printers, the current emphasis in the marketplace seems to be on flashy items such as low cost or speed, he said.

But in the long run, quality is going to be a very important factor; the market is coming to recognize the need for quality, for fully formed numbers in printed characters and for terminals designed with human engineering factors, he said.

There are several reasons for CDC's success in the OEM arena, he indicated. The first is the reputation for quality. People also know CDC will be around in the next five or so years, and salesmen have a full line of products, he continued.

In addition, the firm offers worldwide capability, which is very important in the OEM field, he added.

# Dreyer Calls for Worldwide DP Policy Body

*(Continued from Page 33)*

for us to live with.

"In fact, without the kind of unified action I suggest, doing business will be more costly, less efficient and, in some cases, impossible," he stated.

Dreyer urged Europeans to implement a lobbying effort in their own countries, similar to what Adapso attempts in the U.S., to make their needs forcefully known and taken into account by their governments.

Adapso itself must intensify its own efforts, particularly in the area of privacy and security regulation, he admitted.

He further urged the formation of an international policymaking body composed of DP organizations for the purpose of creating industry stands on critical issues.

"These stands will be communicated to already established international forums created to deal with data-processing related matters, such as the Consultative Committee on International Telephone and Telegraph [CCITT], which develops international telecommunications recommendations, and the OECD, where a Draft Treaty on Privacy and Security will be written," he said.

The issues on electronic funds transfer, privacy and security, tele- and data communications and postal regulations all involve the DP industry as it relates to Federal agencies in Washington and to innumerable state and local agencies, he noted.

Those dealing with myriad governmental bodies should help the U.S. DP industry meet the challenges of international relationships, he said.

### Developmental Differences

Dreyer emphasized, however, the difference between the development of communications sevices here and abroad, where the communications function is a government-run monopoly or quasimonopoly.

The U.S. DP industry works under a system of checks and balances, among them user input, which help telecommunications develop according to user needs, he said. In addition, the industry always has recourse in the Federal Communications Commission and can switch to competing carriers to fight.

"In Europe, however, the telecommunications industry operates quite differently. Due to its governmental status — and to the comparative silence of European user groups — European communication services have developed in a void.

"The results...are not in the best interests of the data processing industry. Yet such services, such as Transpac, can be imposed on a nation regardless of how badly they serve our industry or any other.

"After they are imposed, it is too late to voice our dismay," Dreyer observed.

He reemphasized the need for user input, particularly in the case of bodies such as CCITT, to counteract the influence of common carriers, which is extremely strong. This is particularly true in the case of the CCITT, where the only voting members are governments that, in many countries, control telecommunications.

Of all the countries represented on CCITT, only the U.S. delegation has users among its members.

"If we had an International Data Processing Industry Council as the focal point of our industry to establish international policy on forthcoming proposals, we could persuade our governments before they go to the CCITT or other groups which impact our business," he said.

# SBS Faces Legal Hurdles: Edelson

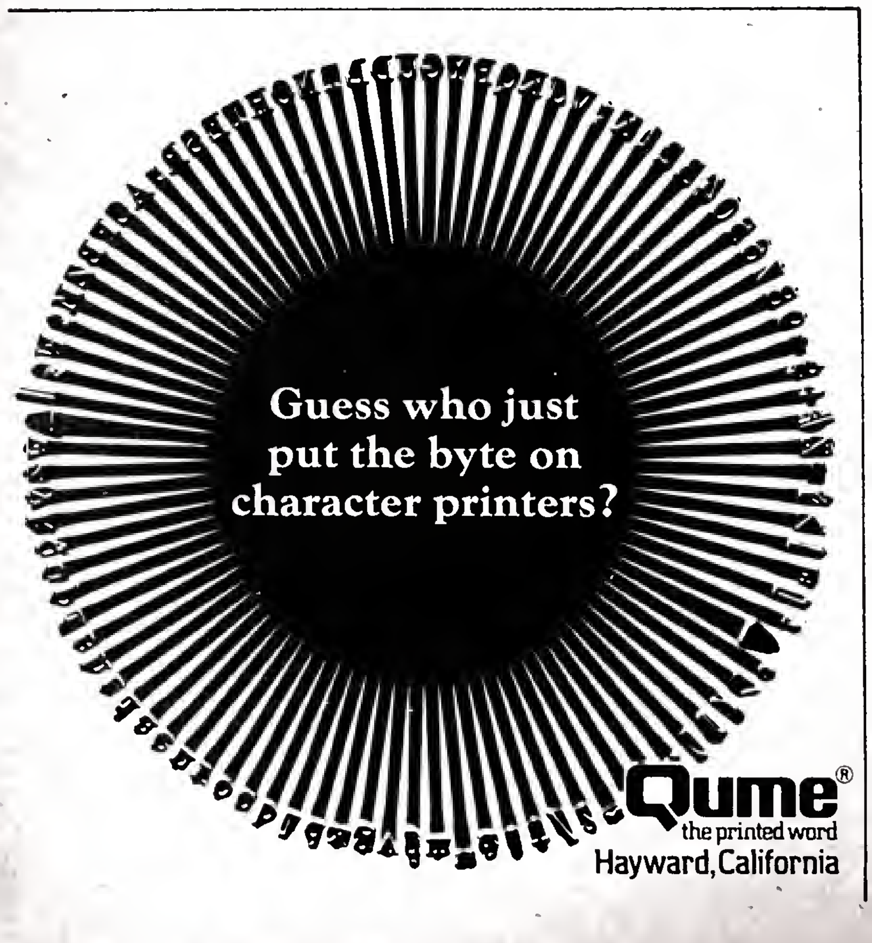
*(Continued from Page 33)*

pendently, it is quite conceivable IBM will get what it really may have wanted in the first place — a 100%-owned domestic satellite subsidiary," he speculated.

Edelson commented that Justice's rational for investigating SBS is "weak," since Comsat's entry would do little to ameliorate the competitive situation.

Total revenues for domestic satellite companies were only about $50 million last year, compared with total telecommunications common carrier revenues of about $35 billion, he noted. "The real competition for AT&T is IBM," he stated.

Edelson concluded by suggesting that ironically, IBM may benefit from the Justice investigation since the two most probable outcomes are that SBS will be approved or that IBM will have to enter the satellite business on its own, perhaps with additional restrictions.



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## Contracts

Computer Sciences Corp. has received a $40 million contract from the National Aeronautics and Space Administration for communications and instrumentation support services at Kenedy Space Center, Fla.

**Grumman Data Systems Corp. has been awarded a $32.5 million contract to upgrade the U.S. Navy's Pacific Missile Test Center's computer facility at Point Mugu, Calif.**

The Marine Systems Division of Rockwell International's Autonetics Group has been awarded a contract by the Naval Sea Systems Command for development of improved sonar processing equipment for the Navy's Poseidon submarine fleet.

**Recognition Equipment, Inc. has received a $6.7 million contract for optical character recognition wand readers from NCR Corp.**

Brandon Applied Systems, Inc. has received contracts totaling $3.1 million from United Airlines, Inc., FMC Corp. of Philadelphia and The Kendall Co. of Boston.

**Harris Corp.'s Data Communications Division has received a $4 million contract from the U.S. General Services Administration for the lease or purchase of remote batch terminal systems by various federal agencies.**

Computer Sciences Corp. has recieved a $3.2 million contract from the Federal Aviation Administration for an automated system to help the agency reduce aircraft delays and conserve fuel.

**Kennedy Co. has received an OEM contract from Contraves AG of Zurich, Switzerland, for Kennedy's Model 9000 tape transports to be used in Contraves' numerically controlled machine tools.**

Electronic Memories and Magnetics Corp. Severe Environment Products Division has been awarded a contract by Lear Siegler, Inc. to furnish memories for use in Lear's ARN 101 navigational computer systems in F4 aircraft.

**Hendrix Electronics, Inc. has been awarded a contract by the *Chicago Tribune* to design and install a comprehensive electronic prepublishing system.**

Lockheed Electronics Co., Inc. has received a contract from the U.S. Postal Service to install its Energy Management System in the Bulk Mail Facility in Jersey City, N.J.

**The Pertec Division of Pertec Computer Corp. has been awarded a contract by Norsk Data A/S of Oslo, Norway, to provide digital magnetic tape transports and tape formatters.**

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## Kits Available on Credit

# Heath Sees Future Revenues From DP

**By Esther Surden**
Of the CW Staff

BENTON HARBOR, Mich. — Heath Co., maker of those do-it-yourself kits for hobbyists, stuck more than just a toe into the personal computer marketplace with its introduction of two computer kit products complete with peripherals (see Page L).

The firm, whch boasted $90 million in sales for 1976 and expects that "in the near future over 20% of company revenues will be derived from computers," has joined forces with Digital Equipment Corp. for one of its products, a personal computer based on the LSI-11, and has designed a less expensive system around Intel Corp.'s 8080A, according to Bill Johnson, vice-president of marketing.

Heath made a stab at the computer hobbyist market before, Johnson recalled. In 1957, it introduced an analog system that cost almost $1,000, but it quickly found out "there was not such a ready market" for the product and adopted a wait-and-see attitude, he said.

Now, the advent of LSI technology combined with lower costs have made home computing possible, he said.

### Systems Approach

"We decided to take a systems approach" and design the products with peripherals so the buyer would not have to go from store to store to find what was needed to complete the system, Johnson said. "This was costly to us because we passed up some substantial sales dollars" while in the development stage.

Hopefully, however, the approach will be profitable in the long run because Heath had a chance to "observe the competition" and "time to do research," he added.

The two systems were designed for a beginner hobbyist and a sophisticated user and had to be able to satisfy the needs of both the hardware-oriented person who likes to know how to put things together and the software and programming types who like a system for what they can do with it, he noted.

They will be available on a revolving charge credit plan Heath offers to its customers. This is believed to be the first time an individual can obtain a computer on such a plan and Heath thinks that the availability of credit will increase the number of people who can comfortably afford the systems.

### In-House Software

The firm has developed an in-house software capability, according to Lou Frenzel, product manager. The smaller of the two products, which is basically a Heath-designed system, was built with the cooperation of the hardware and software people and thus incorporates user features not often found in standard barebones types of systems, he said.

The result of the software effort was dubbed "Benton Harbor Basic" after the firm's headquarters.

A large part of selling to the hobby marketplace is producing easy-to-follow, readable manuals and teaching people how to use the product once it's put together, Frenzel stated.

Heath is now in the process of producing teach-yourself-software manuals for this purpose, an area in which the firm feels it excels. The construction manuals are already completed and ready for distribution, having been tested by nontechnical types and revised.

The company chose its suppliers of CPUs based on what it felt were user needs, he continued. It felt sophisticated hobbyists needed a high-performance 16-bit CPU and evaluated several before choosing the DEC LSI-11.

The contract with DEC includes a licensing arrangement providing use of Assembly and higher level programming languages such as PAL-11, ED-11, Focal and Basic. Heath users will be eligible for membership in Decus, the DEC users group, a company spokesman said, giving them access to applications developed by other users for the LSI-11.

Heath thinks the partnership with DEC will be fruitful since DEC doesn't "typically address itself to individuals," while the kit maker does, Frenzel continued.

The Intel unit was chosen because it was low-cost, had a "proven design, works well and has a tremendous software base," he added.

Heath has added an intelligent front panel, heavy-duty power supply, CRT and paper-tape reader kit of its own design to the value of that CPU to come up with a full system, he said.

# Wescon '77 Set as Biggest Yet

SAN FRANCISCO — Four hundred exhibitors in 680 booths will be on hand here Sept. 19-21 to make this year's Western Electronic Show and Convention (Wescon) the largest in its 26-year history.

In addition to the exhibits, 32 professional program sessions have been scheduled as well as two special sessions entitled "Engineering Careers and the Problems after 40" and "Your Job Interview: The Million-Dollar Decision."

Session topics will range from new advances in peripheral circuits — with papers on the role of peripherals in microcomputer systems and media encryption using bit-slice devices — to satellite systems in the 1980s, with papers addressing the Intelsat V system design, the Tracking and Data Relay Satellite System and Seasat-A, a user-oriented ocean monitoring satellite system.

Other sessions will cover advances in bipolar LSI logic, analog interfaces in microprocessor systems, single-chip microcomputers and new-generation semiconductor memory devices.

The transition to distributed processing, switching power supplies and applications of time-domain measurement systems will also be addressed.

Show hours are 9:30 a.m. to 6 p.m. Monday and Wednesday and 9:30 a.m. to 9 p.m. on Tuesday at Brooks Hall and the adjacent San Francisco Civic Auditorium.

All sessions wil be held in the continental Ballroom Complex at the San Francisco Hilton Hotel. A free shuttle bus will operate between the hotel and the exhibits.

Further Information on Wescon is available from Ted Shields Public Relations, 493 S.Robertson Blvd., Beverly Hills, Calif. 90211.

# HIS Says Orders for Level 6 on Target

**By Molly Upton**
Of the CW Staff

DALLAS — Orders for Honeywell Information Systems, Inc.'s Level 6 line of minicomputers are as planned and are growing nicely with the firm's ability to produce them, according to Jim Pompa, vice-president and general manager of HIS' Small and Medium Information Systems Division.

U.S. shipments of Level 6s are about evenly split between OEMs and end users, Pompa said.

Since the beginning of the year, HIS has signed a major new customer a week, he indicated, adding these are customers who have a potential for 100 systems.

The Level 6 is one of HIS' cornerstones in its thrust toward distributed processing. One of the key markets for the mini is the current HIS end user. A large Level 66 user might buy 30 to 50 minis for distributed processing, remote job entry and data collection, Pompa said.

"Everyone's out competing, but it's logical for our own users to buy the Level 6 because of the research and development and compatible software," he added.

"As more distributed processing appears, there will be more software on the 6 that is also compatible with the other HIS systems. This presents a better value to users of large systems" than other makers' minis, he continued.

The Level 6 features a high level of configurability because each logical function is on a separate board, Pompa observed, noting users can buy what they need.

HIS is also focusing on its terminal line as it relates to distributed processing. "Minis and terminals go hand-in-hand in distributed processing," Pompa said.

HIS is making all major investment in terminals and will offer a totally compatible line of terminals with software as appropriate to function within HIS' distributed processing," he said.

# Executive Corner

- Carl A. Froebel has been promoted to vice-president of portfolio and personal trust services and Robert A. Stafford to vice-president of banking and thrift services for the Financial Data Services Division of Automatic Data Processing, Inc.
- LeRoy C. Ostrander has been elected vice-president for marketing and sales at Epicom, Inc.
- Gary M. Roth has been named vice-president of sales for Anacomp, Inc.'s Kalvar marketing division.
- Stanley A. Brooks has been appointed vice-president of marketing for Information Retrieval Systems Corp.
- Richard A. Strain has been named vice-president and center manager of National Sharedata Corp.
- Joseph G. Scartaccini has been elected vice-president of marketing for Tel-Tex, Inc.
- Michael Novak has been promoted to executive vice-president of Ross Systems, Inc.
- William W. Neal, Howard B. Eskin and Thomas McInerney have been appointed corporate vice-presidents of Automatic Data Processing, Inc.

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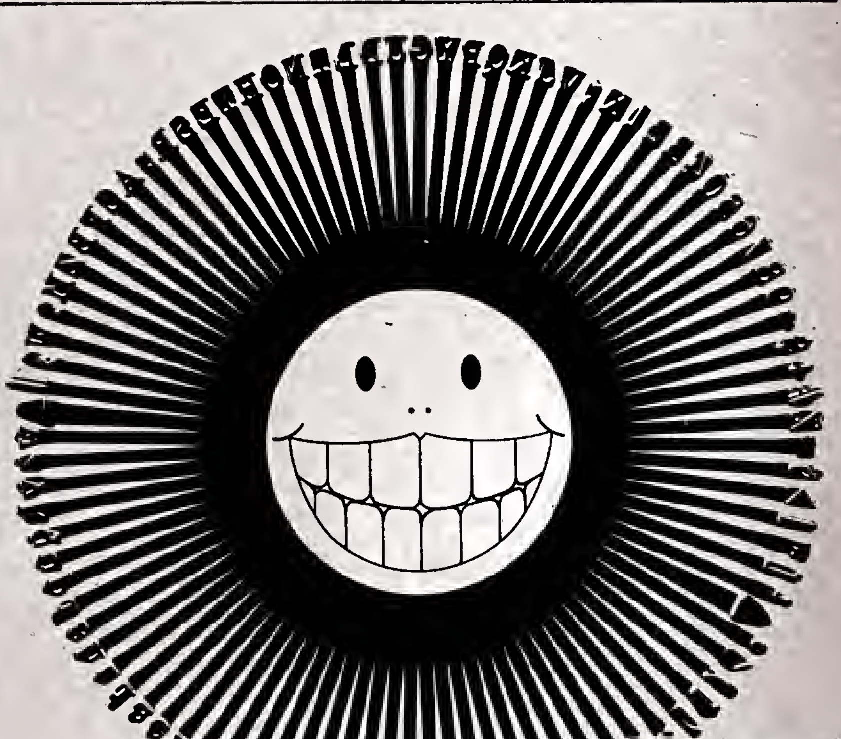
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## Role of the Distributor — Part 2

# Support Programs Called Vital to Organization's Success

**By Bruce Milne**
Special to Computerworld

Today, a minicomputer manufacturer must supply more than hardware, operating systems and discounts in order to ensure a successful distributor organization.

Only a few years ago, selling small business systems via distributors or OEMs was unique. Today there are over 40 companies marketing in this manner and a potential of over 75 more domestic and international entrants who have the technology to be systems suppliers.

Therefore, no matter what the business philosophy of a mini manufacturer regarding distributor support programs, today's competitive environment dictates a comprehensive set of support programs to attract and keep the quality distributor.

The dilemma for the manufacturer is that the primary purpose of distributors is to gain market coverage without heavy investment in a direct sales organization and extensive software development, yet such support programs cost money.

Because of this, the critical task for management is to prioritize these programs to best utilize their limited financial resources.

In order to do this effectively, they have to better understand the needs of their distributors.

In the early '70s, a small wholesale business wanting to solve some of its billing, accounting and information problems might have received proposals ranging from an NCR 400 and Buroughs "L" series to a Basic/Four system or low-end IBM System 3.

There was a dramatic difference in both the approach to the problem and in the technology of the hardware. Selling the differences and benefits of one system over another was an easier task than it is today.

In today's marketing environment, a mini system distributor may have few hardware differences over other minis and systems from the major manufacturers such as IBM and Burroughs.

These "majors," with their huge customer bases and large, experienced sales forces, still constitute the most important competition for distributors. Mini distributors and direct sales people for other mini manufacturers are a distant second and third in importance.

Given this basic understanding of the competitive environment, it is not surprising to find that most distributors feel they lose sales becasue of lack of "image" and customer concern about their longevity.

Because of the increasing importance of software in the systems sales and the lack of hardware differentiation, most distributors believe they must develop more superior applications software and provide financing service to offset the lack of price differences in the market place.

### Areas of Focus

Because of these perceived needs, most distributors would like to see the manufacturers focus on a few key areas:

- Improved communication.
- Cooperative advertising.
- Marketing aids.
- Distributor financing.
- Application software support.

All of these relate to improving the distributor's image and presence in the market place. Communications cover a broad range of distributor transactions including getting concise delivery information, prices, new product information and technical help.

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*This is the last of a two-part series dealing with some of the findings of a recent industrywide survey on the role of small business computer distributors.*

*The research was conducted by Bruce Milne and Barry Klett at the Harvard Business School and was supported by Basic Four, Cincinnati-Milacron, Digital Equipment Corp., Lockheed, Olivetti, Qantel and Sycor.*

*The study included survey responses from 243 distributors and OEMs, interviews with executives of 12 manufacturers that are active in selling via distributors and related research. Because of the similarity in legal relationship, function and problems, distributors, dealers and OEMs were considered together.*

*Part I examined the significance of recruiting distributors as emphasized by manufacturers.*

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In the sales cycle, not being able to get that information on a timely basis can severely hurt the distributor's chances for an order.

Much of the communication problems can be helped by a more focused approach to the management of the distributor. For example, credit, marketing software and service questions may have to be answered by several divisions at the home office or field office, frustrating the distributor. A regional management system that can be the focal point for nearly all of the problems is a much better system.

In advertising, the distributors believe that the "primary" demand for small business computers is being created by the entry and massive advertising campaigns of the major DP manufacturers. They feel the mini makers can better serve the distributors by spending money to help them improve their image with some national advertising and more mailer campaigns, local radio, TV, newspaper and industry specific campaigns.

Marketing aids refer to demonstration programs, video-tape materials, brochures, shows and the like. Again, the distributor needs to project a professional image with his approach and the media he uses.

The financing need can best be met in the form of delayed billing. This is one of the major problem areas for distributors because they are generally undercapitalized.

A good month with two or three systems sales can literally put a distributor out of business if he is not receiving full customer payment for 90- to 120 days, yet is required to pay his supplier in 30 days.

This means a distributor may have to come up with an extra $100,000 or more in short-term funds as well as meet the increased personnel need resulting from the installation demands.

### Support Programs Critical

Manufacturer software support programs are critical to the profitability of the distributor. Considering that the average distributor spends 40% to 50% of his total investment in software development and his net profits are only 6% to 10%, a reduction in the amount spent by him in software developmentwould mean less expense per system sale, more dollars freed for working capital and greater profit and sales.

A comparison of distributor organizations shows the percentage of distributor investment dedicated to software development is nearly half for groups with manufacturer software support vs. unsupported groups. Better results are also shown in sales and profits for the well-supported distributors.

This indicates that the manufacturer should supply some basic modules such as accounts received, accounts payable, payroll and invoicing to eliminate the redundancy in field development work among the distributors for these bread-and-butter applications.

### The Questioning Distributor

A prospective distributor, or one considering changing its equipment sourcing, should naturally consider the reputation, product offering, hardware/software training and equipment service of any manufacturer. However, it should also look closely at the dedication and types of support programs the manufacturer has to insure the distributor's sales success and profitability.

Seven groups of questions a distributor might ask are:

(1) Are the communications links with the manufacturer clear and sufficient? Can I get the information I need on a timely basis?

(2) Are there basic software modules available and an applications interchange system? Are new systems released with basic application and demonstration modules so I don't have to develop from scratch programs and routines to use any new language or operating system?

(3) Is there a national advertising program and budget dedicated to helping me on the local cooperative advertising level?

(4) What types of financing programs are available? Leasing? Delayed billing? What happens if I cannot meet the short-term financial needs? Will the manufacturer help? If the manufacturer is very small, does he have the funds to provide financing programs?

(5) Is there a professional, competitive set of marketing aids available to me including demonstration materials, brochures, customer training aids, etc.?

(6) Are there training programs for management and sales personnel? Are regular seminars held and is there a distributor association supported by the manufacturer?

(7) Does the manufacturer promote industry penetration or is he trying to "shotgun" the general market? Is he stressing product superiority which could be short lived?

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# Univac Starts Market Program

BLUE BELL, Pa. — Univac is actively pursuing the manufacturing industries' DP market by instituting a nationwide marketing program supported by expenditures of more than $20 million this year.

"More than 27% of the computers now installed in the U.S. are operating in manufacturing environments," according to C.R. Williams, vice-president and general manager of the Sperry Univac Americas Domestic operations.

"This large base is currently valued at more than $10.5 billion and is expected to grow to $16.5 billion by 1981," Williams said.

"Our new marketing program has been organized to capture a substantial share of the $9 billion in new and replacement computers, which will be delivered to the manufacturing industries in the next five years," he said.

To date, Univac has received orders from more than 140 manufacturing companies for the Univac Industrial System (Unis) a flexible material requirements planning and production scheduling system.

## Financial News

# DP Firms Found Among Leaders in R&D Spending

By Toni Wiseman
Of the CW Staff

NEW YORK — Data General Corp., which spent 10.7% of its 1976 revenue on corporate research and development, took second place out of 600 firms in the category of percentage of revenue spent on R&D, according to results of a *Business Week* survey.

Hewlett-Packard Co. placed fifth, spending 9.7% of sales, and American Microsystems sixth, spending 9.6%, according to *Business Week* figures.

The survey, compiled with data from the Securities & Exchange Commission (SEC), showed that the 600 firms surveyed increased their R&D expenditures by 11.6% in 1976, compared with a 6.5% increase in 1975, the magazine reported.

Under new SEC rules, companies must report as R&D expenses all costs associated with the search for, and discovery of, new knowledge that may be useful in developing new products, services, processes or techniques, or that might significantly improve existing products, *Business Week* noted.

On the other hand, costs associated with routine product improvement, market research, test marketing, quality control and engineering follow-through in production cannot be expensed as R&D under SEC rules.

In an across-the-board comparison of industries, the office equipment segment, which includes computers, was the top spender in 1976, with aggregate expenditures of 5.4% of sales.

In spending per employee, office equipment was second, with an average of $2,347 per employee, *Business Week* said. Only the drug industry spent more.

For computer firms, IBM's R&D budget was far and away the largest, at $1.01 billion, but California Computer Products, Co. spent the most per employee — $3,592.

DG's expenditures were the largest percentage of sales, Mohawk Data Sciences' were the larges percentage of profits (210.6%) and Electronic Memories and Magnetics (EMM) had the largest percentage change from 1975 (102.3%).

Burroughs Corp., with 1976 sales of $1.9 billion, spent $107.9 million, or 5.8% of revenues, on R&D, a 6.9% increase over 1975, the survey showed. These expenses averaged out to $2,164 per employee and 58.1% of profits.

Calcomp, with $122 million in revenue, spent only $10.1 million, or 8.3% of sales, on R&D, a 7.1% decrease over the previous year. Nevertheless, R&D expenses for the firm averaged out to $3,592 per employee.

Control Data Corp. spent $58.9 million, or 4.4% of its $1.3 billion sales. This represents 124% of its profits or $1,416 per employee, *Business Week* said.

### Further Findings

DG spent 10.5% of its sales and 90.8% of profits — a 47.9% increase over 1975, which averaged out to $2,978 per employee.

Digital Equipment Corp. spent 7.9% of sales and 79.5% of profits, a 20.3% increase. DEC's R&D spending averaged $2,336 per employee, according to *Business Week* figures.

With revenues of $2.5 billion, Honeywell expensed $125.6 million to R&D, which amounts to 5% of sales or 119.3% of profits, but only $1,774 per employee, the magazine said.

While IBM had by far the largest R&D budget, $1.02 billion, that figure represented only 6.2% of sales and 42.2% of profits and averaged $3,466 per employee, the survey found.

EMM spent 102.3% more in 1976 than in 1975. Its $4.7 million R&D expenses represented 5.2% of sales and 61.4% of profits or $1,144 per employee.

NCR Corp. expensed $94.3 million to R&D last year, a 10.9% hike over 1975. This represented 4.1% of sales, 104.7% of profits and $1,407 per employee, *Business Week* noted.

While Storage Technology Corp. reported $7.8 million in R&D expenses or $3,098 per employee, Telex spent only $2.1 million or $910 per employee. The companies' budgets were up 8.2% and 8.9% respectively over 1975.

## Nickels & Dimes

**Comshare** has arranged two financing arrangements. A term loan of $1.2 million has been arranged for the purchase of Xerox/-Honeywell Sigma 9 CPUs and Ampex memory, and a $2.2 million term loan has been arranged for refinancing to improve the terms of notes payable on existing equipment.

$$$

**Hazeltine** has entered into a new $6 million unsecured credit agreement with the Chase Manhattan Bank and the Long Island Trust Co. Hazeltine borrowed $3 million which, with additional company funds, was applied to the payment of $3.8 million to the Federal Deposit Insurance Corp. in full prepayment of a revolving loan and $1 million to Walter E. Heller & Co. in full prepayment of a term loan.

$$$

**Data 100** plans a public offering of $10 million of convertible subordinated debentures due in 1992. The debenture will be convertible into common stock at any time prior to maturity with the interest rate and conversion price to be determined at the time the offering becomes publicly available.

$$$

**On-Line Systems** has declared its first cash dividend, of 5 cents payable July 15 to holders of record June 20.

$$$

**Perkin-Elmer** has declared a quarterly dividend of 8 cents payable July 1 to holders of record June 13.

$$$

**Hewlett-Packard** distributed about $16.2 million to more than 28,400 employees under its cash profit-sharing plan last month. This represented the first profit-sharing cash disbursement made by HP in 1977.

$$$

**General Computer Systems** and **North American Corp.** have acquired 45 data entry equipment leases for GCS 2100 equipment that had been foreclosed upon by the Bank of America

**Making the most of terminal intelligence.**

A special report on *Data Communications Terminals* in the July 25th *Computerworld*.

Intelligent terminals are changing the way we communicate with computers — making them easier to use, more accessible and responsive to users' needs. And *Computerworld's* next special report will focus on conversational and editing terminals, as well as remote batch terminals, CRTs and teleprinters.

Edited by Ron Frank, this report will examine ways to maximize the benefits of terminal networks while minimizing the costs. Using applications stories and tutorials, we'll cover a wide range of topics:

- Ways to determine how much intelligence (i.e. processing logic and memory) you need when changing from dedicated to multiapplication terminals.
- How some users achieved greater efficiency with their dedicated, "dumb" terminals.
- Ways to adapt your existing network to the emerging line protocols.
- Ways to configure terminal networks for multiple applications.
- Managing terminal networks for corporate efficiency — matching requirements with resources and equipment.
- A review of guidelines to use when evaluating terminals.
- The effect distributed data processing is having on terminal selection and use.

In all, this report could help you cut costs in your organization while establishing a firm base for future expansion. If you have anything to do with data communications efficiency, whether as a DP Manager, Communications Specialist, or Executive with an eye for efficiency measures, you shouldn't miss the special report in the July 25th *Computerworld*.

If you're in the business of manufacturing and marketing data communications terminals, you should put your ad here. You'll reach a rapidly expanding market. For example, International Data Corporation expects to see a tremendous increase over the next three years in the installed value of conversational and editing terminals used exclusively for data communications purposes: from $3.2 billion in 1977 to $5.8 billion in 1980. Your *Computerworld* salesman can give you complete details — but don't miss the July 8th ad closing date. Call Terry Williams at (617) 965-5800 to reserve space for your ad.

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## Microcosm

### Based on 8080, LSI-11

# Heath Introduces Kits for Personal DP

BENTON HARBOR, Mich. — The H8 and H11 are personal computers in kit form available from the Heath Co. Although primarily designed for home use, they will probably have some degree of use in very small businesses, the vendor said.

The systems are based on the 8-bit Intel Corp. 8080A micro and the Digital Equipment Corp. LSI-11 mini, according to the firm.

The 8-bit H8 features an intelligent front panel with octal data entry and display and a resident monitor wth built-in bootstrap for one-button program loading or storing, Heath said. The system can accommodate up to 65K of addressable memory.

The H8 is built around a 10-slot bus and features a built-in power supply. Available peripherals include a Heath CRT kit, paper-tape reader/punch, serial and parallel interfaces, a DEC hardcopy terminal and a cassette player/recorder, a spokesman noted.

The H11 features an LSI-11 with 4K of memory expandable to 20K, built-in backplane, power supply and I/O interface accessories. The H11 comes with a software package from DEC that includes an editor, PAL-11 assembler, linker, on-line debugging package, I/O executive, Basic and Focal.

The 12-in. CRT terminal available with the H11 has a 67-key Ascii keyboard with a 12-line, 80-character format. The unit can be formatted in four columns of 12 lines, 20 characters wide, and has a cursor control.

Users can format on the screen and when satisfied batch into their system, the spokesman said.

### Standard Interfaces

Standard serial interfaces include EIA, 20mA loop and TTL I/O. The unit transmits at 110- to 9,600 bit/sec.

A Heath-designed paper tape reader/punch unit will function with any digital computer, the firm said. It uses standard 1-in. wideroll or fanfold 8-level paper tape.

The reader section reads tape at 50 char./sec while the punch operates at 10 char./sec. Punch and reader circuits are completely independent, the firm noted.

The systems and peripherals will be available through Heath retail stores and mail order catalogs, the firm said.

The H8 costs $375 for a "fully wired and tested CPU," assembly and operations documentation. All systems software is included in audio cassette form.

Memory and I/O interface accessories include an 8K board with 4K of static random access memory (RAM) for $140, a 4K expansion chip set at $95, a serial I/O interface board with 1,200 bit/sec audio cassette interface for $110 and a three-port parallel interface which costs $150.

The H11 CPU costs $1,295. A 4K by 16-bit RAM board costs $275, a flexible serial interface costs $95 and a parallel interface costs $95.

The CRT costs $530 in kit form while the paper tape reader/punch unit costs $350.

The firm is also distributing DEC's LA36 printing terminal in assembled form for an undetermined price.

Heath can be reached through Department 350-26, Benton Harbor, Mich. 49022.

## Mits Has Interface For Audio Cassette

ALBUQUERQUE, N.M. — Mits, Inc. has introduced an audio cassette interface for its 680b microcomputer that enables storage and retrieval of data.

The 680b-KACR circuitry is based on the Kansas City Standard, the firm said, and costs $250 assembled.

The price includes 8K of Basic on cassette if the customer has the 680 mainframe and the 680 BSM 16K memory board, a spokeswoman said.

Otherwise, the interface costs $225 and the software costs $200 from the firm at 2450 Alamo S.E., Albuquerque, N.M. 87106.

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CORRECTED ADVERTISEMENT
SPECIAL LETTING OF NOVEMBER 9, 1977

Prospective bidders are hereby advised that the following Advertisement has been corrected to state that *Prequalification of Sub-Contractors will be required for this project.* (See * Net Classification required for bidding the project).

Bids will be received at a Special Letting sheduled for November 9, 1977, at 10:30 a.m. EST in Parlors C&D, Civic Center, Lansing, Michigan, for the following project:

| | | | |
|---|---|---|---|
| PROJECT | I U 82023 | Job No. 04118 A | Fed No. I UI 76(1) |
| | I 82023 | 04121 A | I 94-5(109)216 |
| | U 82111 | 09094 A | U 86-1(210) |
| | I 82195 | 04133 A | I 75-1(164)44 |
| | M 82023 | 11644 A | |

INSTALLATION OF A COMPUTER-BASED FREEWAY SURVEILLANCE AND CONTROL SYSTEM FOR 32.5 MILES OF FREEWAYS IN THE CITY OF DETROIT, WAYNE COUNTY, MICHIGAN. THE PROJECT INCLUDES, BUT IS NOT NECESSARILY LIMITED TO, THE FOLLOWING ELEMENTS:

Provide and Install Data Acquisition and Control System, including Display Panel, Operator's Station, and Associated Equipment.

Design, provide, and install Control Room modifications to accommodate the Control Room equipment, including fire protection, power, climate control, raised floor, etc.

Design the entire field equipment layout, and install traffic detectors on 32.5 miles of Freeway and ramps, and communications equipment to the Control Center.

Install Ramp Metering equipment on six ramps, and communications equipment to the Control Center.

Install closed circuit television cameras and associated equipment at four locations, communications equipment to the control center, and receivers at the control center.

Provide a performance Assurance Service Program for the System for 10 months after acceptance.

Install a Motorist-Aid Call Box System on 13.9 miles of freeway.

This project is a Federal Aid Project under the provisions of the Federal Aid Highway Act of 1968. As defined under Section 113 of Title 23 U.S. Code as amended. The Davis-Bacon Act is applicable and requires the Secretary of Labor to determine the minimum wage rates to be paid by the contractor and subcontractors, which rates will be given in detail in the proposal.

ATTENTION IS CALLED TO SECTION VII OF THE REQUIRED PROVISIONS REGARDING SUBCONTRACTING.

This project is subject to the BID CONDITIONS-AFFIRMATIVE ACTION REQUIREMENTS-EQUAL EMPLOYMENT OPPORTUNITY-DETROIT PLAN. (See Proposal)

Net Classification required for this project is:
1084 N-9* (Computer Traffic Control)
*Prequalification of Sub-Contractor will be required for this project.*

Bid Deposit required is $50,000.00

Completion data is 660 Calendar Days.

Plans may be examined at the Michigan Department of State Highways and Transportation Freeway Operations Unit, 2211 E. Jefferson, Suite 100, Detroit, Michigan

* Prequalification Forms are being furnished for your use in becoming prequalified with the Michigan Department of State Highways and Transportion. If interested in bidding on this Computer-Based Freeway Surveillance and Control System project, you must file all the necessary documents required for prequalification on or before (preferably before) September 20, 1977. In addition, form 1300, Statement of Current Contracts and Subcontracts, as of September 30, 1977, must be submitted by October 12, 1977.

The Michigan Department of State Highways and Transportation hereby notifies all bidders that it will affirmatively insure that in any contract entered into pursuant to this advertisement, minority business enterprises will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award.

# TI Adds Micro Developer

HOUSTON — Texas Instruments, Inc.'s Microprocessor Development System for its TMS 9900 series of microprocessors is based on the FS990 software development system.

The system includes the TMS 9900 emulator/advanced Microprocessor Programming Language (Ampl) package and the FS990 software development system. The disk-based FS990 includes a Model 990/4 microcomputer with 24K words of 16-bit memory, dual floppy disk drives and a Model 913 CRT.

Options include the Model 990 programmable read-only memory (Prom) programmer, Trace Data Module Kit, Model 810 printer and Fortran software license.

The system features 9900 microprocessor emulation, logic state trace, Prom/read-only memory (ROM) implementation, Fortran and Ampl, an interactive control language.

The unit provides software development in both Fortran and Assembly language: integrated software/hardware emulation for debug and test; and firmware implementation, the firm said.

The emulation feature provides support during the entire design phase, from design evaluation through emulation and testing and evaluation, TI said.

The system can also generate stand-alone Fortran routines which can be compiled to 990 computer object code for execution on a 9900 Target system, according to the firm.

The basic system price is $13,600 from TI's Digital Systems Division, M/S 784, P.O. Box 1444, Houston, Texas 77001.

# Sentry Developed for LSI Testing

SAN JOSE, Calif. — Fairchild's Sentry V is a cost-effective version of the firm's Sentry VII testing system for LSI production testing, the firm indicated.

The multitasking Sentry V handles microprocessors, peripheral chips, bit slices, and digital hybrids, among other components.

The unit is source program-compatible with the Sentry II, VII, 600 and 610, Fairchild said, and is hardware-compatible with the Sentry VII.

The hardware is a 24-bit CPU with up to 196K words of semi memory.

Prices for a Sentry V system start at $169,500 for a complete 30-in. system from Fairchild's Instrumentation and Systems Group, 1725 Technology Drive, San Jose, Calif. 95110.

## TEI Producing Unit As Micro Foundation

HOUSTON — TEI, Inc. is producing a foundation unit for a microcomputer system which includes cabinet, power supply and a 12-slot S-100 bus system with all edge connectors inserted, soldered and checked out.

The unit, dubbed The Mainframe, is compatible with all S-100 bus-type PC boards, according to the firm.

A fan is also included.

The unit costs $445 assembled and $395 in kit form from CMC Marketing Corp., 7231 Fondren Rd., Houston, Texas 77036.

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| | Eurasia (U.S. inquiries) | Don Haworth (Dallas) | (214) 233-1818 |
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# F&S Sees $3.5 Billion in Law Office Automation

NEW YORK — Law office automation is a virgin market with a sales potential exceeding $3.5 billion over the next 10 years, even assuming only 50% of the law offices will be substantially automated, according to a recent report by Frost & Sullivan, Inc. (F&S), a market research firm here.

This $3.5 billion in revenues represents about $1 billion for service bureau accounting services, $500 million for small business computer systems and $2 billion for text-editing word-processing systems, F&S said.

In addition, another $2 billion will come from computerized litigation and library research that pertains to the legal profession, the researchers noted.

"We expect that almost all law offices will have some form of test-editing equipment within the next 10 years, with the larger law firms employing shared-logic multiterminal systems and the small- to medium-size law firms having a mixture of the low-cost typewriter with internal memory and the higher cost video terminal minicomputer system," F&S stated.

The report projected text-editing word-processing will yield the highest sales, with annual sales of more than $200 million from 1978.

It added, however, that "the type of text-editing systems will drastically change from a typewriter to video terminal microcomputer system with diskette or disk storage and a line printer. Variations of the text-editing system will include single or multiple terminal systems."

### In-House Systems

By the mid-1980s, about 40,000 law firms will be using DP services and equipment, with most firms opting for their own in-house small business systems, F&S predicted.

Smaller firms will turn to sevice bureaus while medium to large firms, with eight lawyers or more, will be more apt to acquire an in-house system.

Such systems will range from a $15,000 single terminal diskette system with time-accounting software to a $75,000 multiterminal disk cartridge system with accounting and docket control software, it indicated.

### Limited Use?

"The mixture of data processing and word processing, while appearing economical, may see limited use due to the need to perform both activities during the day.

"The larger multiple terminal system could perform both functions, but the law firm will have a high initial purchase cost," the report said.

F&S further noted that computerized legal research, while not specifically a law automation product, will gain considerable popularity with the large number of law firms involved in litigation. It cautioned, however, that only a small number of firms will have sufficient resources to develop such research systems.

"Like other professional service industries, the law office has been bypassed as a market for data processing and sophisticated word-processing services. The competition has been mainly law-oriented service bureaus, independent software companies and some input from the larger data processing companies in a more general sense.

### Open Market

"We feel that the market is still open and companies that can offer both service and equipment will be the most successful. That is, the company must possess capabilities to offer a solution to the entire office automation needs rather than just one segment.

"Since the law office requires a long, hard sell, only those that can offer both varied type products and have financial staying ability will last.

"A nationwide service bureau and small system distributor will have the best chance of success," F&S suggested.

# COM Coming of Age

ROCHESTER, N.Y. — Even though computer output microfilm (COM) equipment has come of age, manufacturers must accept continuing challenges to their ability to provide product enhancements responsive to a changing marketplace, an industry executive said recently.

Computer output microfilmers have survived excessive speculation since their introduction in the late '60s that they would or would not achieve a major level of acceptance, according to Wilbur D. Robinson, Kodak business systems planning coordinator.

"Many feel — and actual COM placements since 1972 seem to support it — that COM's growing pains are subsiding; the product is coming of age," Robinson said.

He cited inflexibilities in hardware and marketing methods as major growth constraints that have been removed.

## New Companies

**Micro Peripherals, Inc.** has been formed to manufacture and market peripheral products for the personal computing, small business systems and OEM markets.

**Interactive Systems Corp.** has been formed with Peter G. Weiner as president.

The firm is located at 1526 Cloverfield Blvd., Santa Monica, Calif.

**NCE Computer Systems, Inc.** has been recently formed. The company will handle international sales and service of minicomputers manufactured by International Computer Products, Inc., in Dallas.

Jim Capuzzo is president. The company is located at 1536 Brook Drive, Downers Grove, Ill. 60515.

**Micropolis Corp.** has been formed to specialize in the design and manufacture of data storage devices for home and industrial microcomputer markets.

Stuart Mabon is president. The company is located at 9017 Reseda Blvd., Northridge, Calif. 91324.

**Comdisco, Inc.** and **Forsythe/McArthur Associates, Inc.**, two third-party leasing companies, have entered into a partnership to form the Terminal Leasing Company.

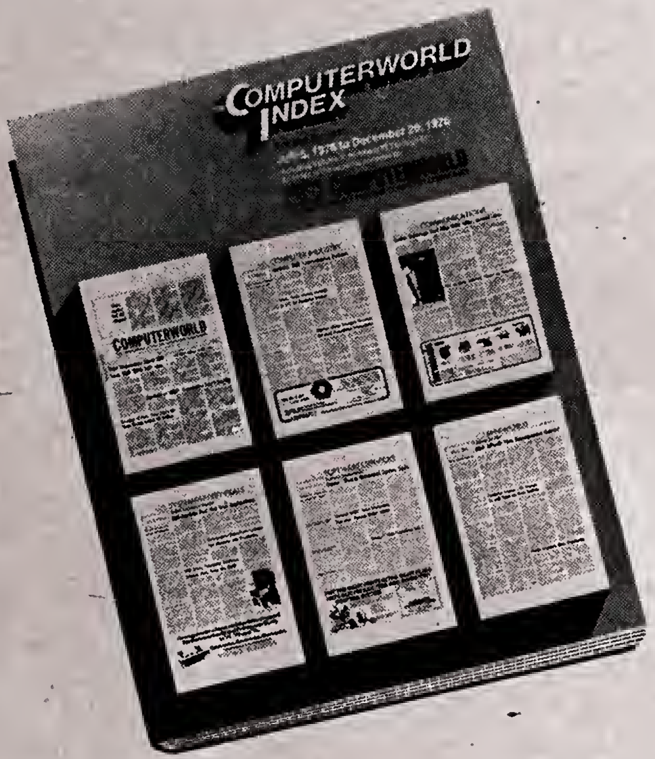
The company is located at 919 North Michigan Ave., Chicago, Ill. 60611.

**EMI Technology (Southeast Asia) Ltd.** has been formed here to market a range of EMI's technological products, including the EMI-Scanner computerized medical X-ray system throughout Southeast Asia.

G.W. Philips has been appointed managing director of the company.

**J.H. Morgan Co.** has been formed to provide consulting services for problems having combined technical and management aspects in the areas of DP, communications and electronic systems.

James H. Morgan is president. The company is located at Post House Road, Morristown, N.J. 07960.



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The first issue of the Index for example, covers the last six months of 1976, and it includes more than 4,000 entries by subject, author and name of any company mentioned. It breaks topics down into highly usable and convenient categories:

- There are entries by *product or service*, like *PRINTERS*, which has 37 entries in the six-month period covered; or *LEASING*, which has 10.
- There are entries by *industry*, like *INSURANCE*, under which there are 17 entries for various stories on the use of computers in the insurance industry.
- *Types of computer applications* is another way you can look something up in The Index. The category *INVENTORY SYSTEMS*, for example, has 21 entries.
- *Regulatory, security* and *social issues* are also indexed. There are 34 entries under *PRIVACY*, 10 under *PRIVACY ACT* and 9 under *PRIVACY PROTECTION COMMISSION*, for example.
- The Index also makes it easy to look into *legal aspects of computer use* with categories like *LITIGATION*, which has 24 entries in the last six months of 1976.
- Even *foreign countries* are indexed. The category *JAPAN*, for example, has 9 entries.
- . . . and there are *others: KIT COMPUTERS* (the kind you build yourself) are the latest thing, and The Index shows 5 entries. *POINT-OF-SALE SYSTEMS* has 14 entries . . . and there's much, much more.

Company Names, for example, are a very important part of The Index. Looking under IBM, we find *ten* categories:

- IBM GENERAL
- IBM LITIGATION
- IBM SOFTWARE
- IBM SYSTEM 3
- IBM SYSTEM 7
- IBM HARDWARE
- IBM PRICING
- IBM POLICY
- IBM SERIES 1
- IBM SYSTEM 32

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# POSITION ANNOUNCEMENTS

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# Amdahl interviewing in Poughkeepsie and Long Island.

Amdahl Corporation, manufacturer of the well-received 470V/6 computer system, has met the challenge of designing and building a new generation of large computers. Although the past year has seen us grow, there's still room on the ground floor for individuals who seek a challenging and friendly environment. Our benefits package is excellent and you'll be well-compensated for your efforts. Following are some of our more immediate needs. If you're a qualified candidate, perhaps the opportunity you desire is here . . . at Amdahl.

### DIAGNOSTIC ENGINEERS

High level languages, logic design. Design and develop advanced diagnostics.

### DESIGN AUTOMATION ENGINEERS

Language design, data base, design verification, test generation, physical packaging, routing.

### DIAGNOSTICS QA ENGINEERS

Software QA, high level and assembly language, logic design and computer organization.

### SOFTWARE ENGINEERS

Mini-computer real time O/S, multiprocessing and large systems. Or configuration management in code control or file control systems.

Amdahl engineers will interview in both Poughkeepsie and Long Island on Sunday, July 17 and Monday, July 18.

Qualified professionals are invited to schedule an interview. Send your resume to Chacko Neroth, Amdahl Corporation, 1250 East Arques Avenue, P.O. Box 5070, Sunnyvale, CA 94086, indicating 435-E on your response. We are, of course, an equal opportunity employer.

amdahl

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## MANAGER

### *Minicomputer Systems/Operntioas*

Responsibilities include coorindation and administration of the academic interactive computing facility. Duties include assisting faculty and students, training and supervising student operators, and managing system resources.

An advanced degree and professional work experience in an academic computing environment is preferred. Knowledge of FORTRAN and BASIC is essential. Some statistical background is desirable.

Salary competitive. Submit complete applications including resume and references to Miami University, 52 Hughes Labs, Oxford, Ohio 45056. Deadline August 15, 1977. EOE/AA

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## PROGRAMMER/ANALYST

**2 positions**

The State University of New York, College at Utica/Rome, seeks two programmer/analysts to design, program, and implement Admissions, Student Records, Personnel, Financial Aids, Budgeting, and Student Accounts Systems on RJE linked to IBM 370/158.

Qualifications: 2-3 years of administrative programming experience using ANS COBOL in large-scale IBM 370/158 OS/VS environment, preferably in a university. Must have OS/VS JCL experience. Assoc. degree in business or data processing. Experience in an RJE, distributive processing, and on-line environments plus a bachelor's degree most advantageous. Salary commensurate with experience and qualifications. Reply by July 22, 1977. Send letter of application, complete resume, and salary history to:

**Personnel/Affirmative**
**Action Office**
**State University College**
**at Utica/Rome (Box 7991)**
**811 Court St.**
**Utica, New York 13502**
*An Equal Opportunity/*
*Affirmative Action Employer*

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Keytronic Corp. is opening offices in New York, N.Y., Boston, Ma., and Dallas, Tx. Positions available include data processing sales, and service representative.

**Sales** — Experience in data processing sales, banking OCR (optical character recognition) technology and/or OCR peripheral add-on equipment, (system sales), heavy commission.

**Service** — Basic requirements include an A.A. degree or equiv. and 1 year of testing Digital Electronic Equipment excellent benefits package included.

Send resume and salary requirements to:

Personnel Dept.
Keytronic Corp.
P.O. Box 14687
Spokane, WA 99214
*We are an Equal*
*Opportunity Employer*

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## PITTSBURGH

## EDP CAREERS

We are EDP recruiting specialists concentrating on positions in the Pittsburgh and Tri-State area. The following is just a cross-section of the opportunities that are available.

| | |
|---|---|
| **Sys/Anal (3)**<br>Mfq & Financial | **To 25K** |
| **Sys. Programmers (5)**<br>IBM hdwe, sftwe, OS internals | **To $26K** |
| **T/P Specialist**<br>IBM 370/OS, CICS | **To $21K** |
| **Prog/Analysts (7)**<br>Cobol, Mfg, Bus & Banking | **To $20K** |
| **Programmers** | **To $18K** |

Cobol, IBM & Honeywell. Send resume inclduing salary history in confidence to Barry Lopez, c/o:

**CAMERON OF PGH., INC.**
**428 Forges Ave., Suite 412**
**Pittsburgh, PA 15219**
**(412) 391-7409**

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## ACADEMIC POSITION ANNOUNCEMENT

**Electrical Engineering**
**Computing Science Division**
**Tulane University**
**School of Engineering**
**New Orleans, LA 70118**

Assistant Professorship effective January 2, 1978. Applicants should have a doctoral degree and a strong interest in teaching undergraduate courses in programming languages, assembly language, systems programming, operating systems and other advanced software topics. Familiarity with PDP-11 desirable. Send resume and three references to:

Dr. Victor J. Law
Chairman, Computing Science Div.
Dept. of Electrical Engineering
School of Engineering
Tulane University
New Orleans, LA 70118

*Tulane University is an equal opportunity/affirmative action employer.*

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## PROGRAMMERS AND ANALYSTS

### Free Employment Service
### Northeast, Southeast & Midwest U.S.

Scientific and commercial applications • Software development and systems programming • Telecommunications • Control systems • Computer engineering • Computer marketing and support

Call or send resume or rough notes of objectives, salary, location restrictions, education and experience (including computers, models, operating systems and languages) to either one of our locations. Our client companies pay all of our fees.

RSVP SERVICES, Dept. C
Suite 700, One Cherry Hill Mall
Cherry Hill, New Jersey 08002
(609) 667-4488

RSVP SERVICES, Dept. C
Suite 300, Dublin Hall
1777 Walton Road
Blue Bell, Penna. 19422
(215) 629-0595

**RSVP SERVICES**
*Employment Agency for Computer Professionals*

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## ANALYST PROGRAMMERS

Applied Financial Technology, Inc. is seeking additional Analyst Programmers with assembler experience for the New Systems group. Knwledge of financial/accounting applications using data base techniques in 3700 DOS/VS environment a definite plus.

We are a subsidiary of Buckeye Federal serving the financial community through tele-processing as well as batch processing.

Salary commensurate with experience. Excellent employee benefits and company paid. Please send resume with salary history to:

aftek

**W. Moore**
**Personnel Department**
**36 East Gay St.**
**Columbus, Ohio 43125**

# SOFTWARE PRODUCT DEVELOPMENT

Link your career to the unprecedented growth of ADR's Software Products Division. Participate in defining, developing, and enhancing our software product line. We are interested in dedicated software professionals who are capable of doing advanced software development. If you have proven outstanding talents in the job areas shown below, we believe you will want to consider career opportunities at ADR.

## SYSTEMS PROGRAMMERS

- MVS experience highly desirable.
- Familiarity with OS internals essential.
- Computer science degree or 2 years experience.

## PROGRAMMER/ANALYSTS

- Stong IBM Assembler language background.
- On-line system development experience in either a DOS/VS POWER, OS/VS, or CICS environment.
- At least 2 years experience or a computer science degree.
- Familairity with COBOL desirable.

## DATA BASE APPLICATIONS/PROGRAMMERS

- Experienced in the use or development of Data Base Management systems.
- Strong IBM Assembler background.
- Minimum 3 years experience.
- College graduate or equivalent.

## TECHNICAL WRITER

- Software documentation experience.
- Degree in English or Journalism.
- Familiarity with IBM computers and languages.

Some Facts About ADR . . . founded in 1959 . . . development personnel average well over 8 years with company . . . field and sales personnel average over 5 years . . . stable (Over $15 million last year) . . . traded on American Stock Exchange . . . employs over 300 people . . . small enough for personal recognition . . . informal and flexible environment . . . representatives throughout the world . . . software product line diverse, versatile, state-of-the-art . . . excellent employee benefits.

Please send resume
with full details including
*current salary and*
*position desired in*
*complete confidence to:*
Personnel Director
Software Products Division
or call (609) 921-8550

**APPLIED DATA RESEARCH**
**Route 206 Center, CN-8**
**Princeton, N.J.08540**
An Equal Opportunity/Affirmative Action Employer

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## SOFTWARE SALES MANAGER

DTSS Incorporated seeks a person to take charge of sales of the Dartmouth Time-Sharing System software. This chief salesperson will also supervise technical sales support personnel, be responsible for costs and revenues, and help formulate sales and pricing policies. Frequent travel should be expected. Candidates should have sales experience and be familiar with computing.

DTSS software, a time-sharing operating system originally developed by Dartmouth College, has been enhanced and refined by DTSS Incorporated. Its particular strengths are in ease-of-use, the economies of large numbers of simultaneously supported users, multiple languages, commonality of foreground/background modes, and highly-developed interfaces to telecommunications networks and interactive terminals. DTSS software runs on Honeywell Level 66 computer equipment and therefore Honeywell supports efforts to sell DTSS software.

DTSS Incorporated is a five-year-old, profitable, New Hampshire corporation owned by Dartmouth College. Current annual sales of nearly one million dollars are due to ten software license agreements with a prestigious list of Fortune-500 companies in the automative, aerospace, chemical, and computer services businesses.

This opportunity is at our offices in Hanover, New Hampshire. This college community in the forested upper valley of the Connecticut river has fine outdoor recreational opportunities, but is is only a few hours' drive from Boston, Montreal, and New York, Compensation includes a base salary plus a strong incentive bonus for successful sales performance. Please send resume to Dr. Robert F. Hargraves, Jr., President, DTSS Incorporated, Box 799, Hanover, NH 03755.

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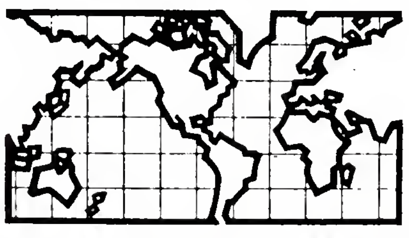
## CICS Applications Manager



You'll Have Ample Career Progress Room.
with This Global Network Unit of ITT

New York City Location,
370/145 DOS/VS Environment

Expand your horizons by joining multi-billion ITT and this rapidly, steadily growing international common carrier division.

At least 2 years of comprehensive CICS applications development and programming in ANS COBOL is required, in addition to supervisory experience qualifying you to lead an on-line development group. Background with CICS applications in BAL will be helpful.

Familiarity is necessary with file structures and design, data base design and management, access methods and current hardware systems architecture.

The position affords favorable advancement prospects. Please send resume, including salary data, in confidence to E. Asmus,

**ITT** *World Communications*

67 Broad Street, New York, NY 10004
*An Equal Opportunity Employer M/F*

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## FIELD SERVICE

| | |
|---|---|
| SYSTEMS | 370/360, H-200, XDS, Univac, CDC All Large & Medium CPU's |
| MINI's | PDP, NOVA, G.A., HP, etc. All Mini Systems |
| I/O | STC, TELEX, CDC, ITEL, CALCOMP, etc. All Peripheral Experience |

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MTTR ASSOCIATES
1107 Mannheim Road $12-24K
Westchester, Ill. 60153
Field Service Specialist
Nationwide Placement
Private Employment Agency
No Fees To Applicants

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## PROGRAM MANAGER

Excellent oppty for seasoned shirtsleeve admin to head up research project. Must have previous supervisory exp + budgeting, scheduling, etc. Key is process control/scientific applications. Degree. $20,000 (Fee paid) Contact P. Siegal

**ROBERT HALF**
**PERSONNEL AGENCIES**
1310 Liberty Bank Bldg
Buffalo, N.Y. 14202
(716) 842-0801

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SYSTEMS Fee Pd To $24K

## SYSTEMS ANALYST

Well known, major corporation located in one of the most desirable work and recreation centers is searching for an ambitious growth minded Systems Analyst.

Experience must include strong interface skills and several years design in commercial, accounting or sales/marketing systems.

You will communicate with all levels of management and have visibility in an IBM, On Line, Data Base environment. Company offers all major benefits and paid relocation. Call, write or visit for information.

**F-O-R-T-U-N-E DATA**
(212) 682-8600
agency 505 5 Av, NYC 10017

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## PROGRAMMERS/ANALYSTS

The Dayton area's largest and most progressive financial institution has openings for experienced Programmers and Systems Analysts.

Two years NCR NEAT/3 or NCR COBOL experience desired. Experience with CIF, CIRF and/or commercial bank applications preferred.

We offer an excellent starting salary plus an outstanding fringe benefit program. Send resume to:

Personnel Division
**Winters**
National Bank & Trust Co. Winters Bank Tower
Dayton, Ohio 45401
*Affirmative Action Equal Opportunity Employer*

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## Director of Computing Services

### Dartmouth College

Directs administrative, technical and development/research activities of Kiewit Computation Center to provide quality computing services to all segments of the Dartmouth College community. Responsibilities include educational and administrative computer services, staffing, training, program and policy development, liaison with committees and user groups, and contacts with other institutions and organizations. Prior experience with a time-sharing computing system is essential, as well as administrative experience in managing a major academic cost center. Preference will be given to candidates who demonstrate a proven ability to relate to diverse user groups including students, faculty and administrative staff. Extensive experience in research and administration of computer-related activities with recent experience at a senior administrative level.

Submit resume by September 15, 1977 to Chairman, Search Committee, Director of Computing Services, 201 Wentworth, Dartmouth College, Hanover, New Hampshire 03755.

**DARTMOUTH COLLEGE**
*An Equal Opportunity/Affirmative Action Employer*

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PROGRAMMERS

## Southern California Edison offers you a career in data processing

Our commitment to explore new applications in computer technology will keep you in the mainstream of your profession. You can become part of a Data Processing Department with 350 employees involved in a state-of-the-art environment based on the 370/168-MP and employing CICS, IMS, and other advanced software packages.

### CICS Programmer

CICS Applications Programmer for development of 700 terminal customer information system. Heavy in assembler, COBOL, MVS, TSO, VSAM. 4-5 years experience preferred. (Dept. 80)

### Systems Programmers

We have one position requiring 2-3 years experience as a Systems Programmer with specific experience in IMS or CICS. VTAM, TCAM and TSO experience helpful. (Dept. 81)

In addition, we have another opening requiring experience with Teleprocessing hardware with some experience in the following areas: VTAM, TCAM, NCP, EP externals and internals. TSO and CICS experience helpful. (Dept. 82)

### Hardware/Software Analyst

Position requires demonstrated proficiency in hardware and software analysis, specifically competitive studies. A proven record of having cost effective recommendations implemented, is essential and experience in hardware planning is a definite asset. A minimum of 3 years related experience, preferably on IBM 370 systems is desired. (Dept. 83)

For consideration, please submit your resume and salary history to Professional Recruitment. (Please indicate Department Number.)

P.O. Box 800, Rosemead, CA 91770

We aggressively support equal
opportunity and affirmative action

**Southern California Edison**
**SCE**

# SYSTEMS SPECIALIST

***Major Dallas Energy Company***

If you are a Computer Systems Professional and have at least 5 years experience in high-level systems analysis and major project leadership, we need your expertise. Your primary responsibility will be in business systems application software, but you will also serve as a liaison between the Systems Development Staff and functional management. We require a degree in computer science, business, engineering or related field and would prefer a masters in business or computer science, plus formal training in systems analysis techniques and project management methods. You must have working experience in oil and gas industry, fabrication manufacturing systems and/or accounting finance systems. Approximately 10% travel is involved. We offer an excellent salary and benefits package. Send resume outlining background, education and salary history, in confidence to:

Employment & Employee Relations

**ENSERCH ENERGY**

P.O. Box 2649, Dallas, TX 75201

*an equal opportunity employer M/F*

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Sycor, Incorporated, a leader in the manufacture of distributed data processing systems, is currently seeking qualified individuals for systems programming positions.

# SYSTEMS PROGRAMMERS

Minimum two years' experience as a Systems Programmer in any of the following areas:

- Data Communications
- Compilers and Languages
- Access Methods
- Data Base Management Systems

Experience in Mini/Micro computers with Assembler language is desired. BS in Computer Science or equivalent is a must. MS is preferred.

Please send resume with salary history to:
Gopi R. Jindal, Ph.D.
Manager, Professional Employment
Sycor, Inc., 100 Phoenix Drive
Ann Arbor, Michigan 48104
(313) 995-1156

*As an Equal Opportunity and Affirmative Action Employer, Sycor, Inc., Urges Females and Members of Minority Groups to Apply.*

**Sycor, Inc.**

**An Intelligent Idea**

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A great measure of our success is the result of the professional EDP team we have. As we grow, we continue to need more such talented individuals to be properly trained. If you're looking for a working environment which is receptive to fresh thinking — and rewards it, you should be exploring what we have to offer. Right now, we're seeking a:

# SENIOR TRAINING SPECIALIST

## Systems and Data Processing

The outstanding individual we are looking for will have many important responsibilities which inlude the:

- **Assessment of training requirements and development of training programs.**
- **Administering and conducting training courses for Systems and Data Processing Personnel.**
- **Identifying end evalueting external training resources.**
- **Assiting in preparation of our Training Newsletter**
- **Preparing of plans and schedules for the implementation of technical training programs.**

To qualify, you should possess 2-3 years' experience in Education and Training in the EDP field. A College Degree is preferred. In addition, specialized knowledge of hardware and software applications is highly desirable. Good communication skills (both verbal and written) are essential.

We offer you an excellent salary and benefits package, outstanding growth potential, and a congenial, professional working environment.

To apply, send your confidential resume with salary history/requirement to: N.P. Fischler, Manager of Employment.

AMERICAN EXPRESS

AMERICAN EXPRESS
COMPANY
CARD DIVISION
777 American Expressway, Ft. Lauderdale, Florida 33307
An Affirmative Action Employer m/f

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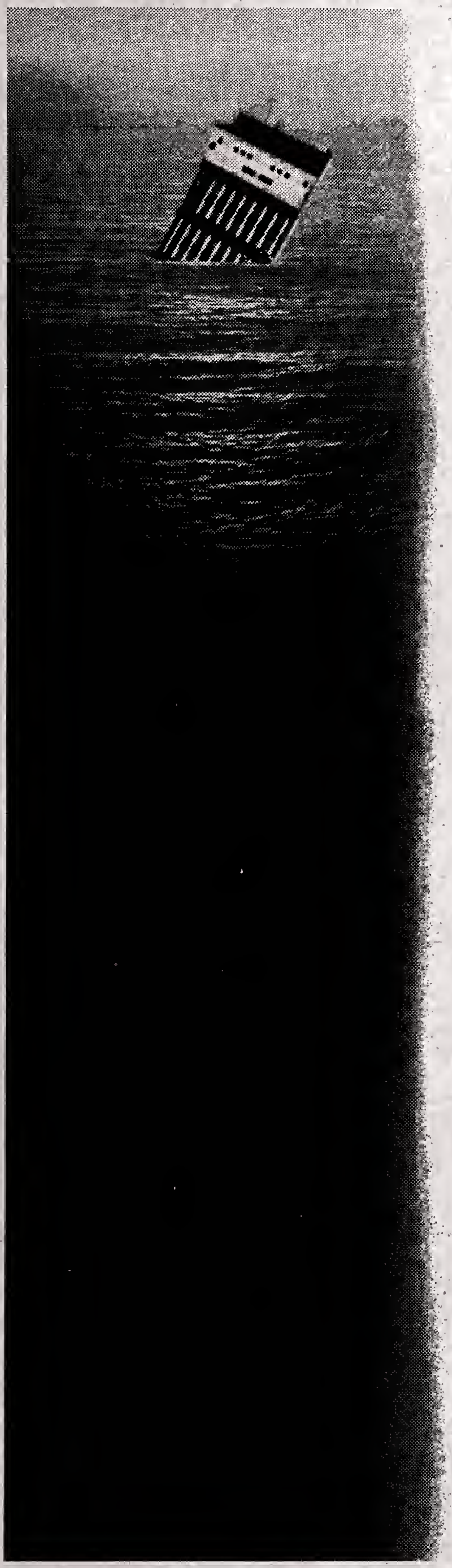

# The Tip of an Iceberg

**There's much more to GTE Automatic Electric Laboratories' involvement in the digital hardware and software evolution in Telecommunications.**

The #3EAX computer-controlled switching system, a portion of which is portraying our iceberg tip, features a digital PCM network and stored program control. It is one of a family of advanced systems spearheading our digital evolution in telecommunications. Our primary assignment is to research and develop the communications systems of the future. Sophisticated systems employing state-of-the-art techniques in digital hardware, and the development of complex software architecture, support systems and programming.

GTE Automatic Electric is a major member of the GTE Family whose research and development expenditures ranked among the top 50 Research and Development spenders in U.S. industry in 1976.

**We are embarking on a major expansion of our technical and laboratory staffs.**

We're talking with skilled professionals. . . not only those with telecommunications experience, but individuals with experience in virtually every segment of the computer, and computer related hardware/software industry, including marketing and manufacturing support. If you have hardware/software skills in any of these areas, talk with us about a growth future in a massive growth field: Application Software, Digital switching systems, logic design, diagnostics, Software/Hardware interface and testing, data base systems, real-time systems design, CAD/CAM, mainframe design, micro/mini systems and design, and related areas.

**For more information about your growth future in Telecommunications, talk with one of our representatives TODAY. Call Toll-Free: (800) 323-1966 or if in Illinois or surrounding areas call Toll-Free (800) 942-0491.**

GTE AUTOMATIC ELECTRIC

400 N. Wolf Road
Northlake, Illinois 60164

Equal Opportunity Employer M/F

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# PERFORMANCE ANALYST

Conn. corp. seeks indiv. with IBM hdwre. performance, software monitor, T.P. network & OS/VS or MVS environment. Will provide Sr. staff consulting to lge. data center director. Salary $22,000+ (Fee paid). Contact Stan Durbas

**ROBERT HALF**
**PERSONNEL AGENCIES**
111 Pearl Street
Hartford, Conn. 06103
(203) 278-7170

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# SYSTEMS PROGRAMMER

OS/MVT, HASP & OS/VS2 (SVS/MVS) experience. Applicant must be a university graduate and have 3 years experience in systems programming OR any combination of university training & systems programming totaling 7 years with no less than 3 years in either. Salary range is $1205 to $1810 per month.

Excellent benefits and working conditions. Send resume to Personnel Office, Northern Illinois University, DeKalb, IL 60115.

*An Equal Opportunity/*
*Affirmative Action Employer*

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# SYSTEMS MANAGER

Major Pacific Northwest company has immediate opening for person with strong administrative and technical skills to direct staff of 15-20. Successful candidate will have managed large scale systems development projects in an IBM 370 environment. Degree in manufacturing or distribution experience preferred to 27K.

Other EDP opportunities available throughout the Pacific Northwest. For confidential interview call or write Al Friedman, (206) 455-8300. Executive Resources, Inc., 310 108th Ave. N.E., Bellevue, WA 98004. All fees paid.

Data Processing

# OPERATIONS MANAGER LARGE COMPUTER CENTER

## *JOIN A COMPANY GROWING 40-50% PER YEAR*

The Computer Services Division of American Management Systems, Inc., has an immediate need to fill the job of Operations Manager in its Arlington, Virginia Computer Center. The Center presently has a 370/165 and a 360/65 running under OS/HASP. Conversion to MVS is in progress. Customers access the AMS Center via RJE, WYLBUR and CICS, using local lines and the Telenet communications network.

The individual we seek must have the ability to coordinate effective use of all computer resources in a service environment, and direct the physical installation and integration of additional hardware.

Persons applying for this challenging position must satisfy the following requirements:

- Funcational knowledge of hardware to insure vendor performance and assist with planning.
- Experience as an operations manager in a large OS or VS environment with substantial teleprocessing.
- Experience in production scheduling and tape library management.
- Experience in development and enforcement of operational procedures.
- Demonstrated leadership qualities and personnel management experience.

In addition, the following qualifications are desirable:

- Experience in VS environment (either SVS or MVS)
- Ability to develop procedures for insuring TP network reliability
- Specific experience in setting up security procedures

Salary will be mid to upper 20's, depending upon experience. Excellent vacation, other fringe benefits.

This is a key position. Potential for profit sharing and stock options within two years.

Please send resume and salary history (do not phone) in confidence to:

Thomas E. Martin
Vice President
**AMERICAN**
**MANAGEMENT SYSTEMS, INC.**
1901 North Moore Street
Arlington, Virginia 22209
*An Equal Opportunity Employer M/F*

AMERICAN MANAGEMENT SYSTEMS INC.
An Equal Opportunity Employer M/F

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# DATA PROCESSING OPPORTUNITIES

Division of NYSE corporation has 2 openings for experienced Data Processing personnel at our South Florida Corporate Offices.

## SENIOR BUSINESS SYSTEMS ANALYST

Successful candidate with above average communication skills should possess the following credentials: Minimum 4 years proven track record in dealing with users to survey problems, evaluate alternatives, and design effective business computer solutions, 3 years business programming experience (prefer COBOL). A college degree, coupled with experience in the distribution industry (prefer soft drink bottling) plus a strong business rather than technical orientation should qualify you for this challenging position. 50% travel involved.

## SENIOR PROGRAMMER/ANALYST

Seeking experienced individual with the following qualifications: minimum 4 years experience in COBOL programming, 1 year programming for 3270 terminal, 2 years experience working with users to meet their needs, experience with structured/top down programming coupled with at least 2 years of successful college studies. Experience in the following areas is desirable, but not mandatory: data/communications and System 3 experience.

Competitive starting salary offered with complete benefit package. Send your resume along with salary history in confidence to:

CW Box 5101
797 Washington St.
Newton, Mass. 02160
*An Equal Opportunity Employer M/F*

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# EDP CONSULTING

To cope with increasing business, a leading international consulting company needs aggressive, ambitious persons in several locations. If you have had systems design experience, sales or marketing with a mainframe vendor or prior consulting experience, and you would like to join an outstanding team, we would like to talk with you. This is an exciting opportunity with top salary and benefits. Outstanding advancement potential, and a highly professional atmosphere. We have openings currently in Los Angeles, Denver, St. Louis, Seattle, Portland and Houston.

For immediate consideration call:

**George Banks or**
**John Gilbert**
**(213) 680-2500**
**or**
**Send resume to:**
**P.O. Box 71683**
**Los Angeles, CA 90071**
*Equal Opportunity Employer M/F*

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# COMMUNICATIONS CAREERS

### Washington, D.C. & Hawaii Facilities

We're Computer Data Systems, Inc., a dynamic computer services company with an ever-growing commitment to our business, financial institution and government agency clients. To enable us to expand our sphere of unparalleled quality services, we need experienced communications professionals in our Washington, D.C. and sunny Hawaii facilities. Applications are welcome in the following disciplines:

## REAL-TIME APPLICATIONS

### * ASSIGNMENTS

Through careful selection and assignment of top state-of-the-art consulting and developmental personnel, we've amassed an extensive automated communications systems capability. We're continuing to expand our efforts, and we need your expertise in the following areas:

### * POSITIONS

Senior Communications Specialists, Senior Analysts; Programmer Analysts.

### * REQUIREMENTS

Experience is desired in one or more of the following areas: ALC, BAL, COBOL, Univac Series 70 or 90/60, Real-Time Communications and Virtual Memory Systems.

But the ball doesn't stop there. We've got additional positions for competent personnel of all concentrations — and we'd like to talk with you about filling them.

You'll enjoy excellent starting salaries equal to your level of experience, company-paid medical and life insurance benefits, tuition assistance, and a high-powered professional environment with unlimited growth potential. Join us — send your resume or call:

**(301) 652-9336**

Computer Data Systems, Inc.
**7315 Wisconsin Avenue-200W**
**Washington, D.C. 20014**
*An Equal Opportunity Employer M/F/H*

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make milgo your future

# PROGRAMMING OPPORTUNITIES

## SOUTH FLORIDA

Milgo Electronic Corporation, a leading manufacturer of data communication equipment, has immediate openings for qualified individuals in the following areas:

### SYSTEMS SPECIALISTS

2-5 years systems analysis and programming experience with business applications. A knowledge of ANS Cobol in an on-line data base oriented environment required. Experience with Univac 1100 series computers helpful. College degree preferred.

### PRODUCT DEVELOPMENT PROGRAMMERS

Experience writing assembler language programs to control peripheral devices with 8080 microprocessor or similar micro-minicomputer. Data communications experience helpful.

### SOFTWARE SUPPORT SPECIALISTS

Knowledge of terminals and peripheral devices with experience in communication codes, software data control protocols and microprocessor programming.

### SCIENTIFIC ENGINEERING PROGRAMMER

Assembly language programming experience to do applications and systems programming. Experience in PDP 11/45 desirable.

Milgo offers excellent salaries, complete company benefits, liberal relocation policy and an opportunity to join a group of highly creative people in sunny South Florida. We invite your inquiries concerning a future with us. Send your resume in complete confidence to Dan Haynes, Job #COM-A82, or call collect (305) 591-5212.

**Milgo Electronic Corporation**
8600 N.W. 41st Street Miami, Fla. 33166
*Equal Opportunity Employer*

Data Processing

## SAN DIEGO SYSTEMS ANALYSTS

**Salary to $1,555 mo.**

The City of San Diego has new systems applications in Police Department which create openings for qualified journey level Systems Analysts. Join our systems team in developing en area Regional Justice Information System.

Currently operate with IBM 370-145 in an OS/VS1; DAS/VS, DB/DC environment. Will soon go to IBM 370-158. Equal to college grad. and 2 yrs. in systems analysis, design AND programming in an ANS COBOL, JCL, OS (Rel. 21 or higher) environment. May substitute additional OS or DOS exp. in an environment equal to, or greater than IBM 360-50 or 370-145 for up to 2 yrs. college. Exam process consists of personal interview, which may be done by phone after application is approved.

**CITY OF SAN DIEGO**
**Personnel**
**202 C St., San Diego, Ca. 92101**
**(714) 236-5753**
*An Equal Opportunity Employer*

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## PROGRAMMER ANALYSTS SYSTEMS ANALYSTS

If you are interested in relocating to the beautiful Pacific Northwest, the State of Oregon has positions available in the Salem area.

### PROGRAMMER ANALYSTS

Positions at this level require three years of experience in programming with emphasis in systems design, Positions at this level involve both systems analysis and programming in the business application field using ANSI COBOL. Heavy use is made of IBM 370 computers and CICS on-line application design.

**SALARY $1190 - $1522**

### SYSTEMS ANALYSTS

Positions at this level are involved in the design of large complex business applications, many of which use the CICS Teleprocessing system. Applicants should have four years of programming and systems analyst experience with a minimum of one year of analyst experience. Major applications are designed using ANSI COBOL on IBM 370 computers.

**SALARY $1251 - $1596**

If you are interested in these positions, submit your resume' to:

**State of Oregon**
**Personnel Division**
**100 Public Service Bldg.**
**Salem, OR 97310**

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# Is Your Career Stifled?

## Digital's Educational Marketing Group Offers Unprecedented Opportunity

Digital's Educational Marketing Group, located in Marlboro, Massachusetts is firmly committed to being the premier source of computer systems, equipment and services for the Educational market. To accomplish this, we are seeking professionals with proven expertise in both the computer business and academia. Our new product lines include advanced, highly sophisticated large computer systems, for any, aspect of an educational institition's needs . . . from servicing business applications to serving as students' learning tools.

Our marketplace is international and our Group is just beginning to grow. This is a ground-floor opportunity to build and advance with a group setting the goals and standards for things to come in one of the most rapidly expanding areas of the computer industry.

## Marketing Managers

We're currently seeking self-starting professionals who can immediately make valuable contributions to our Marketing operations. You'll be responsible for defining new markets, planning, and strategies, product pricing and promotion, including business decisions affecting your areas. In short, you'll be a prime driving force in the marketing structure of this group.

Management positions are available in each of the following marketing areas: School Districts, Community Colleges, and Universities.

The ideal candidate will be an aggressive, creative Marketing professional with academic experience and a familiarity with this market. A knowledge of other systems and equipment in this field is essential. You should also be familiar with large systems and their applications in an academic/administrative environment. The personal qualities that will enable you to contribute to and help direct the Group's growth — decisiveness, ambition, and excellent interpersonal skills — are very important. In addition, you should have a Bachelor's degree in a relevant field, or equivalent, with an MBA preferred.

*For the right person; we offer a very attractive salary and benefits package, plus the opportunity to go as far as your talents will take you with a world leader in the industry. To further investigage these positions, please forward your resume, including salary history to Doug D'Agata, Digital Equipment Corporation, 200 Forest Street, Marlboro, Massachusetts 01752.*

We're the company looking for people.

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digital equipment corporation
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## PROGRAMMER/ANALYSTS

CIBER, Inc. (Consultants in Business/Engineering/Research) is searching for experienced D.P. specialists to help us grow. If you have two or more years experience in medium or large scale operating systems, CIBER can offer:

A firm that is employee oriented.
Varied project assignments while retaining employment continuity.
A firm embarking on an ambitious internal educational progrem.
A firm committed to advancing from within its ranks.
A firm that will help you to improve old skills end develop new skills.
A benefits plan (fully paid) that is a model for the EDP service industry. These benefits include vacations, paid holidays, incentive compensation, life insuarnce, dental insurance end medical insurance.
A firm that provides scheduled reviews and meritorious salary increases.
A firm that will help you achieve finencial end personal rewards.

Our service areas include: utilities, oil and gas, manufacturing, automotive, retail and financial institutions. Many of these areas utilize on-line data base processing, structured design and programming, CICS, IMS, IDS, VSAM, MARK IV and PANVALET.

If we sound interesting to you, send us your resume, or call. We'll show our interest in your future by having one of our staff discuss these and other advantages you could enjoy through employment with CIBER.

All recruiting is conducted through the corporate headquarters in Bingham Farms, MI.

Corporate Headquarters
30400 Telegraph
Suite 386
Bingham Farms, MI 48010
(313) 642-2900

With Branch Offices In
Los Angeles
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## NOW IS THE TIME FOR FLORIDA JOB-HUNTING!

Don't wait for the wintertime crowd. We have many immediate requirements, of which just a few are below.

**Mini-computer Programmers (Compiler Design, Realtime, Diagnostics, Commercial and other Applications) — Entry level to $25K**
**Baning Programmer and Analysts — to $22K**
**IMS, Systems Programmers & Specialists — to $28K**
**Manufacturing Systems — to $25K**

If you plan a trip to Florida this summer, please contact us about 2 weeks in advance. Otherwise, send a resume or call:

**LOUISE RESNICK**
**DATA SCIENCES PERSONNEL, INC.**

**15490 N.W. 7 Ave.**
**Miami, Florida 33169**
**(305) 685-7891**

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**Application Programmerto $18,000**
370-Os, JCL and COBOL experience

**Systems Analyst to $20,000**
Experience in IBM 370 or UNIVAC 1100 series.

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**PARKER PAGE ASSOCIATES**
P.O. Box 12308
Seattle, WA 98111
Offices: Seattle, Wash., D.C., Michigan, Atlanta

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# SYSTEMS ENGINEERS

***We're looking for a few good people. The kind who'd like to make income match accomplishment***

We're successful, rapidly growing software company that prides itself and its people.

To join our tight-knit, highly professional marketing team, you should have:

- An excellent computer background, including a thorough knowledge of OS and OS/VS systems, utilities and JCL; a college degree in a scientific discipline would be a plus.

You'll be thoroughly trained and become highly proficient in our software programs and those of our competitors. You'll travel extensively in the U.S. and Canada, from a Northern New Jersey base.

The job is challenging, the standards are high. So is the compensation. It's the kind of job where you can use your brains and energy to life your income.

If you thrive on challenge and meet the rest of the standards, we'd like to talk to you. Send a confidential resume to:

CW Box 5098
797 Washington St.
Newton, Mass. 02160

# Grow with Amdahl and be a part of the future. MVS expertise needed.

*Like to shoot dumps?* Amdahl needs:

## FIELD SUPPORT REPRESENTATIVES

You should have good MVS internals experience and the ability to debug, plus expertise in one of the following areas:

- VTAM/NCP
- VSAM
- JES 3
- TSO/TCAM

Current openings are in Sunnyvale, California.

*Like customer contact?* Amdahl needs:

## SYSTEMS ENGINEERS

At customer locations. You should have MVS diagnostic expertise and the ability to be a jack-of-all-trades.

Currently there are several openings throughout the United States.

*Like to do both of above with travel?* Amdahl needs:

## HEADQUARTERS SYSTEMS ENGINEERS

To work with Field Engineers at customer locations to solve more difficult bugs.

You should have very good diagnostic techniques preferably with some MVS experience.

Current openings are in Sunnyvale, California.

*NO MVS EXPERTISE?* Drop us a note anyway. We also have systems engineering openings that do not require MVS experience.

*Please direct your response to Amdahl Corporation, 1250 East Arques Avenue, Sunnyvale, CA 94086 and indicate 310-D on your resume or letter. We are, of course, an equal opportunity employer.*

**amdahl**

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Data Processing

# GROWTH IN IMS DATA PROCESSING

## MANY OPPORTUNITIES!! MAJOR EXPANSION EFFORT!!

At CNA Insurance, innovation is never on vacation. We're constantly looking for the new way—the better way...and that applies to our internal operations as well as our marketing approach. The current expansion of our Information Services Division-Claims Systems is an example of things to come!

We're adding to our staff in many ways and that means excellent ground-floor opportunities and high visibility for the professionals who join us. If you'd like to be a major contributor in a rewarding, highly competitive environment, take a look at these openings:

### PROGRAMMERS

In addition to several junior level programmers who have some COBOL programming experience and preferably some knowledge of IMS Data Base, we're also looking for more advanced programmer analyst/ consultants who can bring 4-6 years programming experience including COBOL and IMS Data Base to these positions.

### PROJECT LEADER

This position has hands-on involvement and direct functional responsibility for several analysts and consultants on medium and large scale projects for claims processing. A degree in Business, Computer Science, Insurance or Math backed by at least 7 years experience in systems and/or personal and commercial insurance (systems related) will be essential. Excellent written/verbal communications ability is a must and a background in claims related processing is preferred.

### SYSTEMS ANALYSTS

Successful candidates for these challenging positions will analyze current group systems and future requirements for new systems in the claims area. Responsibilities include collection/analysis of factual material on current systems, interviewing various users, defining informational needs, and documenting findings and recommendations.

### PROJECT SUPERVISOR

As a Project Supervisor for Manual Systems Development you will have project leadership responsibility for the analysis, design and implementation of major corporate systems. Requirements are five to seven years of systems analysis and design experience in the area of manual administrative processing systems. One to two years experience in project leadership, planning and control is also required.

We are presently looking for project supervisors with insurance industry background – claims experience preferred.

### SENIOR SYSTEMS ANALYST

As a Senior Analyst for Manual Systems Development you'll be responsible for the design and implementation of the manual (people) portion of large corporate systems projects. Requirements are three to four years experience in manual systems design and methods, with a thorough knowledge of project planning and administrative processing techniques. Project leadership and effective communication abilities are a must.

We are presently looking for an analyst with insurance industry background – claims experience preferred.

Our rapid industry growth spells FUTURE for you...in addition to genuine career advancement potential we offer competitive starting salaries, excellent company benefits including liberal relocation policy, and a dynamic, highly professional atmosphere. Send a detailed resume stating position of interest and salary history, in complete confidence, to:

Phil Gniot

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# SR. SYSTEM ANALYST

NCR offers significant challenge and growth potential to highly qualified programmer analysts who want to take part in the design and implementation of a state-of-the-art distributed processing system. This system is in the early design stages and the time to join the program is NOW!

Our system is business-oriented since our customers will be primarily COBOL users. It provides multiple modes of processing in a distributed data base environment. All our development is done interactively and all our software is written in high level languages.

We want people who have taken part in the design and implementation of at least one successful, modern operating system. Data base and data communications knowledge is a definite plus. We offer a highly competitive compensation plan and an outstanding benefits and relocation package.

We are located in a beautiful rural area, yet are just minutes from San Diego, beaches and mountains, and several universities. Recreational, cultural, and educational opportunities abound.

If you are results-oriented and experienced in O.S. design we want to hear from you. Please send your resume and salary requirements in confidence to the Professional Placement Office at the address below:

NCR

**Data Processing Division**
**16575 W. Bernardo Drive**
**San Diego, Calif. 92127**

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## COMPUTER HARDWARE AND SOFTWARE CANDIDATES

**RELAX**

We have scores of openings in all parts of the U.S. Our fees are paid by hiring companies anxious to find qualified computer hardware and software candidates. Contact the nearest office for confidential service and let us do the footwork.

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**Data Services Consultants**
**5401 W. Kennedy Blvd., Suite 285**
**Tampa, Florida 33609**
**(813) 872-2631**

**COMPUTER CAREERS INC.**
**Specialists-Data Processing**
**4720 Montgomery Lane**
**Suite 503**
**Bethesda, MD 20014**
**(301) 654-9225**

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## DATA BASE PLANNER

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**Hartford, Conn. 06103**
**(203) 278-7170**

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## NCR PROGRAMMER

Experienced NCR Century Programmer for established So. California based installation with need for new systems development. Must program in NEAT/3. Salary commensurate with experience and excellent company paid benefits. For immediate consideration send resume or call.

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**Cerritos, Ca. 90701**
**(213) 926-4487**
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**(714) 521-8775**

field engineering

# A Very Good Year for Us. A Better One for You?

Most computer professionals are aware that today's most advanced large-system technology was developed by a company that, not too long ago, was virtually unknown.

Now the phenomenon is widely known. Amdahl's 470V/6 performs as promised. And the company performs as promised: our hardware and software support exceeds the established standards.

Not well known, however, is that this major supplier of large systems is still, in terms of staff size, relatively small. At Amdahl, you're not lost in a sea of people: we began 1976 with less than 400 people and ended it with less than 800. There's still room on the ground floor.

We're looking for above-average talent. You can expect an above-average compensation and benefits package. Please direct your response to Employment Manager, Amdahl Corporation, 1250 East Arques Avenue, Sunnyvale, CA 94086. We are, of course, an equal opportunity employer.

Immediate openings throughout the U.S. and Canada. Field candidates will undergo a training period in California on full salary with housing, transportation, and other expenses provided.

## FIELD ENGINEERING SPECIALISTS

You will have a minimum of 5 years' experience in maintaining large-scale systems with in-depth training on compatible CPUs. You will have company support in assisting the Amdahl customer in his mixed-vendor environment to maintain full operations in his center. Openings in several major cities and at Amdahl headquarters in California. Please indicate 560-E on your response.

## FIELD ENGINEERS

You will carry the Amdahl philosophy of customer service as well as your expertise into the field, utilizing your initiative and talents to aid the customer in restoring computer center operations regardless of the origin of the failure. Large system experience essential, preferably on compatible equipment. Please indicate 567-3E on your response and direct it to the Amdahl regional office nearest you as shown below.

Amdahl Corporation
1250 East Arques Avenue
Sunnyvale, California 94086

Amdahl Corporation
680 Fifth Avenue
New York, New York 10019

Amdahl Corporation
2021 Spring Road
Oak Brook, Illinois 60521

Amdahl Corporation
22150 Greenfield Road
Oak Park, Michigan 48237

Amdahl Corporation
5454 Wisconsin Avenue, Suite 1535
Chevy Chase, Maryland 20015

**amdahl**

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## 21 SHOESTRING START-AT-HOME COMPUTER BUSINESSES

113 page research report uncovers areas never published, plus hundreds of how-to-do-it ideas on moonlighting, starting up, image building, bidding, contracts, failure signals, and much more. A superior career planning tool. $12.00 (check, Mastercharge, Bankamericard) Guaranteed Refundable,, to DATASEARCH INC., Suite 108, 730 Waukegan Rd., Dept. G, Deerfield, IL 60015.

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## PROGRAMMER/ ANALYST
### CICS

Growing Florida Corporation interested in finding experienced CICS/VS Programmer/Analyst. If you are aggressive, self-starting and full of ideas we are interested in talking to you. Current environment is 370/145 1.25 MEG. DOS/VS. Planned environment is 370/145 1.25 MEG. OS/VSI.

Please reply to:

Kermit E. McKinney
Manager
Data Processing
Lawyers' Title Services, Inc.
P.O. Box 3588
Orlando, Ela. 32802

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# Computer System & Software Engineers

## You can get ahead faster with us than with anybody else.

Here's why:

**1 You are needed right now.** Our project teams are crying for good professionals who can grab hold fast.

**2 You'll get a chance to prove how good you are.** Everybody is evaluated regularly; there are no missing persons at TI. If you're good, you move up fast. No matter how long the people above you have been there.

**3 You'll be involved in state-of-the-art projects.** Air Traffic Control. Satellite navigation systems. Landing systems. Radar and infra-red sensor systems. Computer-aided design, manufacturing and electrical test systems, machine tool control, text processing and process control. Acoustic data and image processing. In addition, an Advanced Software Technology Department has been formed to develop state-of-the-art tools, procedures, and languages for computer system design and software production. TI is the technological leader in literally scores of product fields. This leadership has produced more than 5,000 patents.

**4 You'll work on a complete system.** No threat of getting locked into a repetitious specialty. You'll work on a small project team. You'll interface daily with other disciplines and other phases of your overall program.

**5 You'll work in a job-stable, multi-market situation.** We have a variety of products and markets. We're not heavily dependent on any one of them—and neither is your job.

### Entry Level or Experienced Openings for U.S. Citizens

**Software System Designer**
M.S. in Computer Science or Engineering and experience in design of software systems for real-time and interactive systems.

**Computer System Engineer**
M.S. or PhD in Electrical Engineering or Computer Science and five years experience in hardware and software design of real-time computer systems.

**Engineering System Analyst**
M.S. or PhD in Math, Physics, Computer Science, or Engineering, and experience in analysis of engineering systems.

**Programmers**
B.S. in Computer Science, Math, Physics, or Engineering and programming experience with higher order languages such as Fortran, Pascal or PL/I. Both scientific and real-time programmers are required.

**Language Processor Designers**
M.S. or PhD in Computer Science and three years experience in development of programming languages, compilers, translators, assemblers and link editors.

Send your resume in confidence to:
**Staffing Manager/P.O. Box 6015, M.S. 222/Dallas, Texas 75222.**

TEXAS INSTRUMENTS
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## SENIOR SYSTEMS PROGRAMMERS

The State University of New York at Buffalo is expanding its senior systems staff to meet a challenging growth demand. Qualified candidates may expect to lead a wide variety of operating system software development and maintenance activities in support of research and instructional computing. SUNY/AB is currently supporting local batch, remote batch and time-sharing on a CDC CYBER 173 under NOS. Development of a hierarchical distributed computing network and scheduling/queue-management software is planned for the near future. Substantial systems programming experience on large scale time sharing operating systems is required. In addition, candidates should have particular expertise with internals of language processors, I/O handlers, job and resurce schedulers, telecommunications software, or performance measurement and evaluation techniques. Experience with KRONOS, NOS, CDC software, hardware and more than one operating system would be helpful. Salaries competitive. Excellent fringe benefits. Eligibility for future permanent appointment.

Buffalo offers a wide variety of summer and winter sports and cultural events. We have excellent spectator sports, water sports, and nearby camping and skiing. In addition to a first rate symphony Orchestra and local jazz and theater, the summer Shaw Festival and the city of Toronto are a short drive away.

Application deadline for both positions is July 31, 1977. Write or call in confidence.

James Whitlock
Academic Computing Center
4250 Ridge Lea Road (46)
Buffalo, N.Y. 14226
(716) 831-1761
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# FLORIDA POWER CORPORATION
# FLORIDA WEST COAST
## (IBM SYSTEM 370 MODEL 158 - OPERATING SYSTEM - VS2)

## SENIOR APPLICATIONS ANALYST

Function as project leader and systems analyst on large computer information systems projects with complete responsibility for design, development and implementation. Position requires bachelor's degree and seven years experience. Accounting, financial, or engineering background is desirable.

## STANDARDS & PROCEDURES ANALYST

Responsible for the development of internal EDP technical standards and procedures. Includes auditing of installation activities to ensure adherence to established standards and procedures. Position requires a capable technical writer, with current programming experience, systems analysis and design experience and experience in developing EDP standards and procedures.

## SYSTEMS PROGRAMMER ANALYST II - TELECOMMUNICATIONS

Responsible for the development and maintenance of teleprocessing supervisory control programs. Position requires bachelor's degree, five years programming experience, extensive assembler language experience, and working knowledge of COBOL, TCAM, TSO, CICS and IBM JCL.

**Submit resumes and salary requirements to**

Florida Power Corporation
Box 14042
St. Petersburg, Florida 33713
EMPLOYMENT SUPERVISOR
MICHAEL S. REEDER

Florida Power
CORPORATION

*AN EQUAL OPPORTUNITY EMPLOYER*

# Software Professionals:

If you have a background in Systems Analysis, Systems Programming, Operating Systems Support, Data Base Management or Software Course Development and Teaching, we would like you to consider a unique opportunity to broaden your technical background while imparting your expertise to Digital employees and customers.

In this high visibility position, you will interface with many levels of Digital employees and customers. You will be responsible for determining and developing a broad range of advanced software instructional course material required for the support of both current and future products.

As a member of our Educational Services Group you will be involved in the following areas of technology:

- Data Base Management
- Data Communications
- Commercial Applications
- Computer Networks
- Operating Systems
  (DOS, IAS, RSTS, RSX-11, RSX-20F,
  RT-11, TOPs-10, TOPS-20)
- Programming Languages
  (ALGOL, APL, ASSEMBLY, BASIC, BLISS, COBOL,
  DIBOL, FOCAL, FORTRAN, RPG)

If you are a highly motivated self-starter who can conceptualize what is required to solve specific problems and then develop the resources to solve the problems within a dynamic, unstructured environment, we would like to talk to you.

Additional positions are available in Hardware Course Development as well as for Software and Hardware Instructors.

*Forward resume outlining salary requirements to Mary Ann Joyce, Digital Equipment Corporation, Dept. K74, 162 Main Street, Maynard, Massachusetts 01754.*

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# SYSTEMS PROFESSIONALS

We are a New England manufacturer and a subsidiary of a Fortune 100 Company with the following openings in our dynamic and growing MIS function.

## LEAD PROGRAMMER ANALYST

This position requires a proven pro who wants to join a top-notch manufacturing systems team charged with implementing MRP, shop floor control, and manufacturing control systems. You'll need a degree with 5-8 years of COBOL experience including IMS DB/DC. Your role will be one of technical leadership and consultation as well as programming the more challenging aspects of the project.

## PROGRAMMER/ANALYSTS

We need several individuals to work on state-of-the-art distributive processing systems to support our field operations. Qualified candidates will possess 3-5 years of programming experience in Assembler or COBOL and the following skills:

- **On-line remote processing**
- **Batch teleprocessing**
- **Mini processing**
- **Full screen processing**

This is an opportunity to join a systems team that will be automating order entry, inventory control, pricing/invoicing and statistical sales. These positions are in an organization that is responding to business needs and will provide you growth opportunities in and out of MIS.

*Send resume and salary history to Manager of Professional Staffing, Optical Products Division.*

**AO American Optical**
OPTICAL PRODUCTS DIVISION

**14 Mechanic Street**
**Southbridge, MA 01550**

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The Data Processing Authority of Multnomah County, Oregon, currently has a 370/155 with OS and HASP. We are running a large teleprocessing system interfaced to DL/1 and other data base systems. We currently have openings for:

## MANAGER—APPLICATIONS SYSTEM DEVELOPMENT

A middle-level management position reporting to the Director of a regional government data processing facility exists for an aggressive, experienced data processing professional. The successful candidate will immediately take responsibility for a portfolio of applications projects currently budgeted at about $400,000 annually.

The facility is strongly committed to quantitative approaches to all data processing functions. Applicant should provide details in support of resume demonstrating experience with this management process. Salary history also required. Initial screening will be based on quality of experience details submitted.

Annual salary is $24,000 to $25,400.

## SYSTEMS ANALYSTS

Responsible for administration and technical management of multiple automated systems, from feasibility study through implementation. Position requires demonstrated success in the design and implementation of major systems projects, prior supervisory responsibility, project planning/management skills, familiairty with data base management and telecommunications concepts, and proficiency in COBOL. The applicants must also demonstrate excellent written and oral communications skills.

## SYSTEMS PROGRAMMERS

To work in the areas of OS and HASP maintenance, data base management systems (DL/1 and others), telecommunications, and capacity management. Position requires experience with OS/MFT OS/MVT, HASP, assembler language, JCL, and utilities. Experience with teleprocessing systems and data base systems (particularly DL/1) also desirable.

Multnomah County is an equal opportunity employer and provides excellent benefits including medical and dental plans.

**Please submit information to:**
**E.L. Prichard, Director**
**Multnomah County Data**
**Processing Authority**
**4747 East Burnside**
**Portland, Oregon 97215**

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# PROGRAMMERS - ANALYSTS
# PROJECT LEADERS - EDP AUDITORS
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Insurance, Retail, Manufacturing. To $26,000

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Prominent international commodity trading firm Wall St. area seeks experienced EDP Manager to take full charge central computer functions. Working executive required for IBM System 3 Mod 10 hardware with full knowledge Cobol and RPG II,,small to medium scale environments and knowledge microcomputers. Experience commodity trading essential with added background in futures trading and sound accounting. Present computer applications cover physical/futures commodity trading, A/R, A/P, G/L, inventory and trading positions. Planned applications indicate shift to distributed data base system over next few years using minis/micros network plus vouchered accounts payable and cash flow forecasting. Company offers generous salary, excellent growth potential and broad company paid benefits including pension. Please send fully detailed resume with salary history to CW Box 5097, 797 Washington St., Newton, Mass. 02160. All replies will be held in strictest confidence. Please be specific and thorough in your response. Equal Opportunity Employer.

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# SENIOR SALES REPRESENTATIVE

MetriData Computing, a leading computer service company in the Midwest, is in need of experienced sales representatives. Qualified candidates will have three to five years of data processing sales experience. Must have ability to direct large account sales efforts of our Remote Computing Services. Compensation commensurate with experience and performance.

Send resume, in confidence, to:

**Mr. Gene Schulstad**
**MetriData Computing, Inc.**
**P.O. Box 21099**
**Louisville, Kentucky 40211**

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# MIS PERSONNEL

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Life Insurance Company is seeking insurance oriented MIS Personnel to assist in the development of On-Line Data Based Projects.

If you are committed to excellence and can qualify as an MIS Project Manager, Systems Analyst or Programmer Analyst, you may have the opportunity to relocate at our expense to a medium size city on the Chesapeake Bay.

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Principals only reply to:

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**C/O Personnel Dept.**
**Sun Life of America**
**20 South Charles St.**
**Baltimore, Maryland 21201**
**or call (301) 727-0400 Ext. 310**
**EOE-M/F**

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dp people inc.

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D.P. People, Inc. can effectively represent your interests because we have worked as a programmer, systems analyst, project leader, manager of systems/programming, and as a data processing manager prior to opening a professional personnel agency specializing in data processing people. We currently have numerous career opportunities in the banking, insurance and manufacturing industries.

Please send us a copy of your resume with a cover letter explaining your objectives if you are willing to try an agency that cares about you and what you are seeking to achieve. All listings are FEE PAID, with relocation expenses either paid or negotiable.

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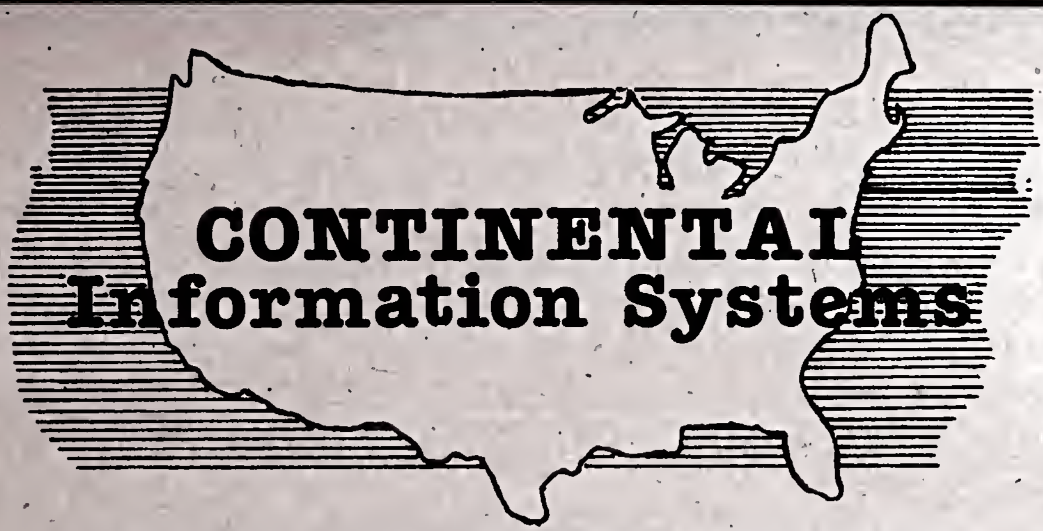

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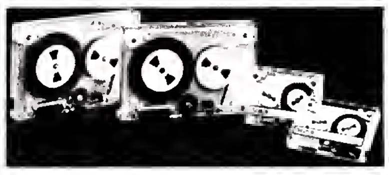

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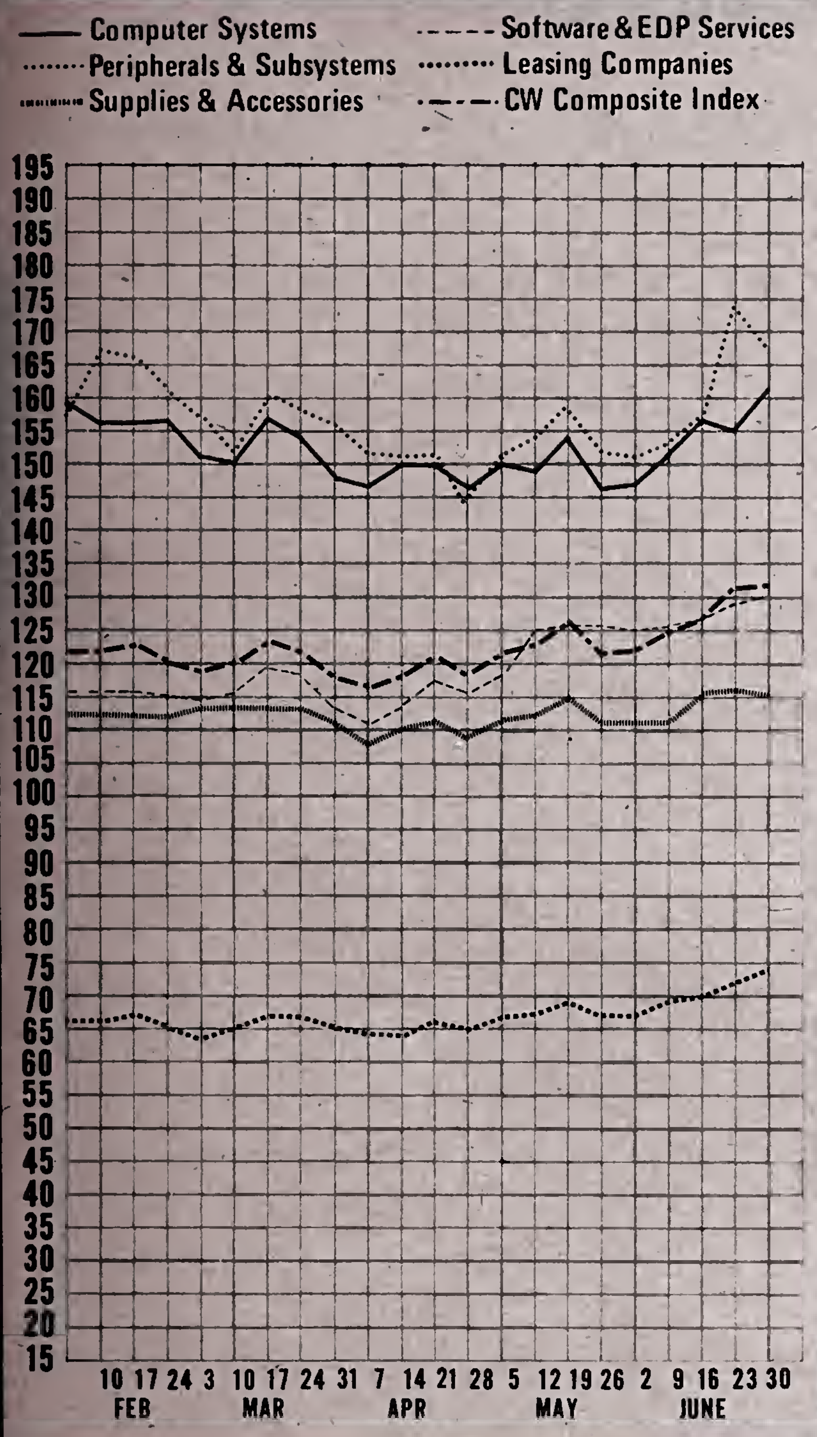
## COMPUTERWORLD Computer Stocks Trading Indexes



# Earnings Reports

### ANALOG DEVICES

Three Months Ended April 30

| | 1977 | 1976 |
|---|---|---|
| Shr Ernd | $.32 | a.$28 |
| Revenue | 11,679,000 | 9,755,000 |
| Earnings | 545,000 | 475,000 |
| 8 Mo Shr | .62 | a.53 |
| Revenue | 22,583,000 | 18,323,000 |
| Earnings | 1,061,000 | 878,000 |

e-Adjusted to reflect 5% stock dividend paid in April 1977.

### DATA TECHNOLOGY

Year Ended April 30

| | 1977 | 1976 |
|---|---|---|
| Shr Ernd | ..... | $.50 |
| Revenue | $9,807,000 | 10,502,000 |
| Earnings | (5,000) | 610,000 |

### BALL

Three Months Ended April 3

| | 1977 | 1976 |
|---|---|---|
| Shr Ernd | $.64 | $.70 |
| Revenue | 105,834,000 | 94,606,000 |
| Earnings | 2,965,000 | 3,235,000 |

### CAMBRIDGE MEMORIES

Three Months Ended November 27

| | 1978 | 1975 |
|---|---|---|
| Shr Ernd | $1.63 | $(.39) |
| Revenue | 1,891,000 | 4,718,000 |
| eSpec Cred | 2,832,000 | ...... |
| Earnings | 2,764,000 | (658,000) |

e-From sale of memory equipment previously leased to customers.

### COMPUTER AUTOMATION

Three Months Ended April 3

| | 1977 | 1976 |
|---|---|---|
| Shr Ernd | $.82 | $.43 |
| Revenue | 12,056,338 | 7,967,455 |
| Earnings | 1,620,709 | 841,500 |
| 9 Mo Shr | 1.78 | 1.14 |
| Revenue | 29,986,211 | 22,331,977 |
| Earnings | 3,489,418 | 2,213,486 |

### COMPUTER PRODUCTS

Three Months Ended April 1

| | 1977 | 1976 |
|---|---|---|
| Shr Ernd | $.11 | a$.08 |
| Revenue | 1,893,269 | 1,346,650 |
| Earnings | 159,824 | 113,417 |

e-Adjusted for 20% stock dividend in November 1976.

# Computerworld Sales Offices

**Vice-President/Marketing**
*Roy Einreinhofer*
**Advertising Administrator**
*Terry Williams*
COMPUTERWORLD
797 Washington Street
Newton, Mass. 02160
Phone: (617) 965-5800
Telex: USA-92-2529

**Boston**
*Robert Ziegel*
**Northern Regional Manager**
*Mike Burman*
**Account Manager**
COMPUTERWORLD
797 Washington Street
Newton, Mass. 02160
Phone: (617) 965-5800

**New York**
*Donald E. Fagan*
**Eastern Regional Manager**
*Frank Gallo*
**Account Manager**
COMPUTERWORLD
2125 Center Avenue
Fort Lee, N.J. 07024
Phone: (201) 461-2575

**San Francisco**
*Bill Healey*
**Western Regional Manager**
*Jim Richardson*
**Account Manager**
*Donna Dezelan*
**Account Coordinator**
COMPUTERWORLD
1212 Hearst Bldg.
San Francisco, Calif. 94103
Phone: (415) 495-0990

**Los Angeles**
*Bill Healey*
**Western Regional Manager**
*Jim Richardson*
**Account Manager**
*Judy Milford*
**Account Coordinator**
1434 Westwood Boulevard
Los Angeles, Calif. 90024
(213) 475-8486

**Japan:**
*Mr. Shigema Takahashi*
**General Manager**
Dempa/Computerworld
1-11-15 Higashi Gotanda
Shinagawa-ku, Tokyo 141
Phone: (03) 445-6101
Telex: J2424461

**United Kingdom:**
*Tony Vickers*
Computerworld Publishing Ltd.
140-146 Camden Street
London NW1 9PF, England
Phone: (01) 485-2248
Telex: UK-26-47-37

**West Germany:**
*Hans-Jurgen Ballnath*
Computerworld GmbH
8000 Munich 40
Tristanstrasse 11
West Germany
Phone: (089) 36-40-36
Telex: W.Ger-5-215250-HKFD

TRADE*QUOTES

# Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, JUNE 29, 1977

All statistics compiled, computed and formatted by
TRADE★QUOTES, INC.
Cambridge, Mass. 02139

| EXCH | | PRICE | | | |
|---|---|---|---|---|---|
| | | 1977 RANGE (1) | CLOSE JUN 29 1977 | WEEK NET CHNGE | WEEK PCT CHNGE |
| | **COMPUTER SYSTEMS** | | | | |
| O | AMDAHL CORP | 0- 39 | 26 | +2 1/4 | +9.4 |
| N | BURROUGHS CORP | 55- 91 | 61 5/8 | +2 1/4 | +3.7 |
| O | COMPUTER AUTOMATION | 18- 28 | 26 | + 1/4 | +0.9 |
| N | CONTROL DATA CORP | 20- 26 | 21 1/2 | + 1/8 | +0.5 |
| N | DATA GENERAL CORP | 35- 47 | 45 3/8 | +2 | +4.6 |
| N | DATAPOINT CORP | 18- 30 | 27 | +1 5/8 | +6.4 |
| N | DIGITAL EQUIPMENT | 37- 53 | 47 1/4 | + 7/8 | +1.8 |
| N | ELECTRONIC ASSOC. | 2- 3 | 2 | + 1/4 | +14.2 |
| A | ELECTRONIC ENGINEER. | 8- 10 | 8 1/4 | - 5/8 | -7.0 |
| O | FOUR-PHASE SYSTEMS | 13- 17 | 15 3/8 | + 1/4 | +1.6 |
| N | FOXBORO, | 42- 54 | 50 5/8 | - 1/2 | -0.9 |
| O | GENERAL AUTOMATION | 6- 9 | 7 | + 1/8 | +1.8 |
| O | GRI COMPUTER CORP | 1- 1 | 5/8 | 0 | 0.0 |
| N | HEWLETT-PACKARD CO | 69- 87 | 78 3/4 | +1 3/4 | +2.2 |
| N | HONEYWELL INC | 44- 55 | 53 7/8 | - 1/4 | -0.4 |
| N | IBM | 245-286 | 265 1/4 | +4 7/8 | +1.8 |
| O | MANAGEMENT ASSIST | 5- 9 | 6 3/8 | +1 | +18.6 |
| O | MEMOREX | 23- 29 | 24 1/8 | +1 5/8 | +7.2 |
| O | MICRODATA CORP | 7- 18 | 9 1/2 | + 1/4 | +2.7 |
| O | MODULAR COMPUTER SYS | 5- 8 | 7 5/8 | + 1/4 | +3.3 |
| N | NCR | 32- 38 | 36 7/8 | + 3/8 | +1.0 |
| O | PRIME COMPUTER INC | 12- 17 | 15 3/4 | + 1/4 | +1.6 |
| N | PERKIN-ELMER | 17- 21 | 20 5/8 | + 3/4 | +3.7 |
| N | RAYTHEON CO | 16- 33 | 30 5/8 | - 3/4 | -2.3 |
| N | SPERRY RAND | 34- 42 | 37 | + 1/2 | +1.3 |
| O | SYCOR INC | 8- 15 | 10 3/4 | +2 3/8 | +28.3 |
| A | SYSTEMS ENG. LABS | 5- 7 | 6 | - 1/4 | -4.0 |
| N | VARIAN ASSOCIATES | 15- 21 | 20 1/4 | - 3/4 | -3.5 |
| A | WANG LABS. | 14- 18 | 17 | +1 5/8 | +10.5 |
| | **LEASING COMPANIES** | | | | |
| O | BOOTHE COURIER CORP | 8- 10 | 9 1/4 | + 1/2 | +5.7 |
| O | COMDISCO INC | 10- 13 | 10 | + 1/4 | +2.5 |
| A | COMMERCE GROUP CORP | 2- 2 | 2 1/8 | + 1/8 | +6.2 |
| A | COMPUTER INVSTRS GRP | 1- 2 | 7/8 | 0 | 0.0 |
| M | DATRONIC RENTAL | 1- 2 | 1 | 0 | 0.0 |
| A | DCL INC | 1- 2 | 1 7/8 | + 1/8 | +7.1 |
| N | DPF INC | 6- 8 | 7 3/4 | + 1/8 | +1.6 |
| N | ITEL | 13- 19 | 17 3/4 | + 1/8 | +0.7 |
| N | LEASCO CORP | 19- 24 | 22 3/4 | +1 3/4 | +8.3 |
| O | LEASPAC CORP | 1- 2 | 7/8 | - 5/8 | -41.6 |
| O | NRG INC | 0- 0 | 1/8 | - | -33.5 |
| A | PIONEER TEX CORP | 5- 11 | 5 5/8 | - 1/8 | -2.1 |
| N | U.S. LEASING | 10- 14 | 13 7/8 | 0 | 0.0 |
| | **SOFTWARE & EDP SERVICES** | | | | |
| O | ADVANCED COMP TECH | 1- 2 | 1 1/4 | - 1/8 | -9.0 |
| O | ANACOMP INC | 7- 9 | 8 7/8 | + 1/2 | +5.9 |
| A | APPLIED DATA RES. | 5- 9 | 9 | 0 | 0.0 |
| N | AUTOMATIC DATA PROC | 23- 30 | 28 1/2 | + 1/2 | +1.7 |
| O | COLEMAN AMERICAN COS | 2- 2 | 1 7/8 | 0 | 0.0 |
| O | COMPU-SERV NETWORK | 10- 15 | 12 1/2 | + 1/2 | +4.1 |
| O | COMP ELECTION SYSTMS | 6- 9 | 9 1/8 | + 3/8 | +4.2 |
| O | COMPUTER HORIZONS | 1- 1 | 1 1/4 | 0 | 0.0 |
| O | COMPUTER NETWORK | 6- 7 | 5 7/8 | - 1/8 | -2.0 |
| N | COMPUTER SCIENCES | 7- 9 | 7 7/8 | + 1/4 | +3.2 |
| O | COMPUTER TASK GROUP | 1- 2 | 2 | 0 | 0.0 |
| O | COMPUTER USAGE | 2- 3 | 1 5/8 | - 1/8 | -7.1 |
| O | COMSHARE | 5- 7 | 4 3/4 | 0 | 0.0 |
| O | DATA DIMENSIONS INC | 4- 5 | 3 5/8 | - 1/8 | -3.3 |
| O | DATATAB | 1- 2 | 1 7/8 | - 1/8 | -6.2 |
| N | ELECTRONIC DATA SYS. | 16- 20 | 19 1/2 | + 1/8 | +0.6 |
| O | INSYTE CORP | 2- 3 | 1 7/8 | + 1/4 | +15.3 |
| O | IPS COMPUTER MARKET. | 1- 2 | 1 1/2 | 0 | 0.0 |
| O | KEANE ASSOCIATES | 3- 4 | 3 5/8 | - 3/8 | -9.3 |
| O | KEYDATA CORP | 2- 3 | 2 | 0 | 0.0 |
| A | LOGICON | 7- 17 | 17 1/4 | + 1/8 | +0.7 |
| A | MANAGEMENT DATA | 1- 2 | 1 1/4 | + 1/8 | +11.1 |
| A | NATIONAL CSS INC | 19- 25 | 21 | +1 3/8 | +7.0 |
| O | NATIONAL DATA CORP | 4- 7 | 5 1/4 | - 1/8 | -2.3 |
| A | ON LINE SYSTEMS INC | 17- 22 | 18 1/8 | - 7/8 | -4.6 |
| N | PLANNING RESEARCH | 3- 5 | 4 1/4 | + 1/8 | +3.0 |
| O | PROGRAMMING & SYS | 1- 1 | 5/8 | 0 | 0.0 |
| O | RAPIDATA INC | 2- 3 | 2 1/4 | 0 | 0.0 |
| O | REYNOLDS & REYNOLD | 17- 20 | 18 3/4 | + 3/4 | +4.1 |
| O | SCIENTIFIC COMPUTERS | 1- 3 | 3 | - 1/8 | -4.0 |
| O | TYMSHARE INC | 14- 20 | 18 3/4 | +1 1/4 | +7.1 |
| A | URS SYSTEMS | 4- 5 | 4 1/2 | - 1/4 | -5.2 |
| N | WYLY CORP | 1- 2 | 1 1/4 | - 1/8 | -9.0 |
| | **PERIPHERALS & SUBSYSTEMS** | | | | |
| N | ADDRESSOGRAPH-MULT | 10- 14 | 14 3/8 | +1 1/8 | +8.4 |
| O | ADVANCED MEMORY SYS | 7- 9 | 8 | + 1/2 | +6.6 |
| N | AMPEX CORP | 8- 10 | 10 1/4 | +1 1/4 | +13.8 |
| O | ANDERSON JACOBSON | 3- 4 | 3 3/4 | + 3/8 | +11.1 |
| N | APPLIED DIG DATA SYS | 10- 16 | 14 1/4 | + 1/8 | +0.8 |
| O | BEEHIVE INT'L | 8- 12 | 9 3/8 | + 7/8 | +10.2 |
| A | BOLT,BERANEK & NEW | 7- 8 | 6 7/8 | + 1/4 | +3.7 |
| N | BUNKER-RAMO | 8- 12 | 10 1/4 | + 7/8 | +9.3 |
| A | CALCOMP | 3- 5 | 3 | 0 | 0.0 |
| O | CAMBRIDGE MEMORIES | 1- 3 | 2 1/4 | + 1/4 | +12.1 |
| N | CENTRONICS DATA COMP | 22- 29 | 26 5/8 | -1 1/4 | -4.4 |
| O | COGNITRONICS | 1- 1 | 5/8 | 0 | 0.0 |
| O | COMPUTER COMMUN. | 5- 6 | 6 3/8 | + 7/8 | +15.9 |
| O | COMPUTER CONSOLES | 4- 7 | 6 | 0 | 0.0 |
| A | COMPUTER EQUIPMENT | 2- 3 | 3 1/4 | 0 | 0.0 |
| O | COMPUTER TRANSCEIVER | 1- 1 | 1 | 0 | 0.0 |
| O | COMTEN | 9- 13 | 11 3/4 | + 1/4 | +2.1 |
| N | CONRAC CORP | 19- 28 | 23 1/2 | -1 3/4 | -6.9 |
| O | DATA ACCESS SYSTEMS | 4- 5 | 4 | - 1/4 | -5.8 |
| O | DATA 100 | 6- 8 | 6 3/4 | - 5/8 | -8.4 |
| A | DATA PRODUCTS CORP | 9- 13 | 12 5/8 | + 3/4 | +6.3 |
| O | DATA TECHNOLOGY | 3- 4 | 4 | 0 | 0.0 |
| O | DATUM INC | 1- 2 | 1 5/8 | + 1/8 | +8.3 |
| O | DECISION DATA COMPUT | 2- 2 | 2 1/4 | 0 | 0.0 |
| O | DELTA DATA SYSTEMS | 1- 1 | 3/8 | 0 | 0.0 |
| N | ELECTRONIC M & M | 4- 5 | 3 3/4 | - 1/2 | -11.7 |
| O | FABRI-TEK | 1- 2 | 1 1/8 | - | -4.9 |
| O | GENERAL COMPUTER SYS | 0- 2 | 1 3/8 | + 1/8 | +10.0 |
| N | HAZELTINE CORP | 9- 12 | 9 3/4 | + 1/8 | +1.2 |
| N | HARRIS CORP | 28- 39 | 37 | - 1/2 | -1.3 |
| A | INCOTERM CORP | 11- 15 | 11 3/4 | - 3/8 | -3.0 |
| O | INFOREX INC | 4- 7 | 4 1/2 | + 1/8 | +2.8 |
| O | INFORMATION INTL INC | 9- 14 | 9 1/4 | 0 | 0.0 |
| O | INTEL CORP | 38- 57 | 48 1/2 | +2 1/2 | +5.4 |
| A | LUNDY ELECTRONICS | 3- 6 | 4 3/8 | + 1/4 | +6.0 |
| O | MSI DATA CORP | 6- 10 | 9 3/8 | + 3/8 | +4.1 |
| N | MOHAWK DATA SCI | 5- 8 | 5 5/8 | + 3/8 | +7.1 |
| O | PENRIL CORP | 2- 5 | 4 3/8 | + 1/8 | +2.9 |
| A | PERTEC CORP | 7- 9 | 8 3/8 | + 7/8 | +11.6 |
| A | POTTER INSTRUMENT | 2- 2 | 1 3/4 | 0 | 0.0 |
| O | PRECISION INST. | 2- 2 | 1 1/2 | 0 | 0.0 |
| O | QUANTOR CORP | 4- 5 | 3 7/8 | - 1/4 | -6.0 |
| O | RECOGNITION EQUIP | 6- 10 | 8 1/2 | - 1/8 | -1.4 |
| O | SCAN DATA | 1- 2 | 1 5/8 | - 1/8 | -7.1 |
| O | STORAGE TECHNOLOGY | 10- 15 | 14 5/8 | + 5/8 | +4.4 |
| O | T BAR INC | 7- 11 | 10 3/8 | - 1/4 | -2.3 |
| O | TALLY CORP. | 4- 6 | 4 1/8 | - 1/4 | -5.7 |
| O | TEC INC | 7- 10 | 8 7/8 | + 1/4 | +2.8 |
| N | TEKTRONIX INC | 29- 36 | 35 | - 1/2 | -1.4 |
| N | TELEX | 2- 3 | 2 7/8 | - 1/8 | -4.1 |
| O | WILTEK INC | 1- 1 | 1/2 | 0 | 0.0 |
| | **SUPPLIES & ACCESSORIES** | | | | |
| O | BALTIMORE BUS FORMS | 2- 4 | 1 3/4 | + 1/8 | +7.6 |
| A | BARRY WRIGHT | 10- 14 | 13 1/4 | - 3/4 | -5.3 |
| O | CYBERMATICS INC | 1- 1 | 5/8 | 0 | 0.0 |
| O | DUPLEX PRODUCTS INC | 14- 18 | 16 3/4 | - 5/8 | -3.5 |
| N | ENNIS BUS. FORMS | 6- 7 | 6 1/4 | + 1/8 | +2.0 |
| O | GRAHAM MAGNETICS | 11- 14 | 13 1/2 | - 1/2 | -3.5 |
| O | GRAPHIC CONTROLS | 15- 18 | 16 1/2 | 0 | 0.0 |
| N | 3M COMPANY | 48- 56 | 49 5/8 | - 3/8 | -0.7 |
| O | MOORE CORP LTD | 28- 37 | 28 1/4 | - 1/2 | -1.7 |
| N | NASHUA CORP | 16- 22 | 20 3/4 | + 3/8 | +1.8 |
| O | STANDARD REGISTER | 18- 25 | 22 1/2 | -2 | -8.1 |
| O | TAB PRODUCTS CO | 13- 17 | 16 | - 1/4 | -1.5 |
| N | UARCO | 19- 22 | 20 1/4 | + 1/4 | +1.2 |
| A | WABASH MAGNETICS | 10- 15 | 14 | - 3/8 | -2.6 |
| N | WALLACE BUS FORMS | 17- 21 | 17 3/4 | + 1/2 | +2.8 |

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
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Illinois 312-640-0050 • Massachusetts 617-237-4673 • Michigan 313-358-1640 • Minnesota 612-835-6722 • Missouri 314-821-6680 • New York 212-736-0316 • North Carolina 704-568-8966
Ohio 216-836-0457, 513-554-4424 • Pennsylvania 215-884-8697 • Texas 713-771-5781, 214-233-0270 • Virginia 703-790-1191
In Europe contact: Telex International Group, in Japan contact: Kanematsu-Gosho Ltd.